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FARKAS & MANELLI P.L.L.C.
ATTORNEYS

April 23, 1997

Hand Carry (Group 2600, Crystal Park II, 8th Floor)
Supervisory Examiner Douglas Olms
U.S. Patent and Trademark Office
Washington, D.C. 20231

Re: U.S. Patent 5,586,121 (Appln. No. 08/426,920)
Filed: April 21, 1995
Inventor: Moura et al.
For: Asymmetric Hybrid Access System and Method

Dear Mr. Olms:

Following our personal interview yesterday regarding Appln. No. 08/558,378 (a divisional application of the subject application), we enclose a courtesy copy of a Petition and Declaration of Assignee for Correction of Inventorship, filed in the above identified issued patent on March 20, 1997, to expedite review and action on the Petition.

Also enclosed for your convenience is a copy of a certified copy of the file wrapper of Appln No. 426,920 (the subject application).

Early action is respectfully requested.

Sincerely,

Lawrence Harbin
Reg. No. 27,644

LH:es

Enclosure

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re UNITED STATES PATENT

Eduardo J. Moura and Jan M. Gronski

Patent No.: **5,586,121**
Issued: **December 17, 1996** Group Art Unit: 2603

Appln. No.: 08/426,920
Filed: April 21, 1995 Examiner: Douglas Olms

Title: ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

* * * * *

Petition and Declaration of Assignee and Applicants For Correction of Inventorship

Pursuant to 35 USC §256 and 37 CFR §1.324, the undersigned applicants and assignee hereby petition the Commissioner of Patents and Trademarks for issuance of a Certificate correcting the inventive entity named in application no. 08/426,920 (the '920 application) that led to United States Patent 5,586,121 (the '121 patent), as well as, the inventive entities relative to the claims contained in all Rule 60 continuation and divisional applications based on the '920 application.

In support of this petition, we declare and affirm as follows:

1. Through error and without any deceptive intent we attest that Frederick Enns, ("Enns"), Robert L. Packer ("Packer") and Robert A. Luxenberg ("Luxenberg") should have been named as joint inventors along with named inventors Eduardo J. Moura ("Moura") and Jan M. Gronski ("Gronski").

2. The inventors inadvertently omitted contributed to the claimed subject matter of the '121 patent at least in the following manner: (i) the acknowledgment suppression feature of application claim 17[1], as amended (claim 8[2] in the '121 patent) was jointly conceived and reduced to practice by Packer, Moura and Gronski (the invention of claim 17 as originally filed was conceived and implemented by Packer), (ii) the power level control feature recited in application claim 19, as amended (claim 9 in the '121 patent) was jointly conceived by Gronski, Luxenberg and Packer, and (iii) the shared/dedicated channel feature implicitly recited in dependent claims 31-35, 42, 45, 49, 54 of the issued '121 Patent[3] (introduced by amendment of July 31, 1996[4]) was jointly conceived by Moura, Gronski, Enns and Luxenberg.

3. The inadvertent omission of Packer (a former employee of assignee) as a joint inventor was discovered on or about January 2, 1997 shortly after issuance of the '121 patent. In particular, Packer notified Moura on December 30, 1996 that he observed claimed subject matter recited in the '121 patent claims directed to acknowledgment suppression and

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[1] Attachment A.

[2] Attachment E.

[3] Attachment E.

[4] Attachment C. See corresponding claims 44-48, 55, 58, 62 and 67 of the issued '121 patent (Attachment E).

that his name was missing from the issued patent. Within days, Moura contacted assignee's patent counsel who, in turn, interviewed the named inventors and Packer as to their respective contributions to the inventions claimed in the '121 patent, as issued, and in the '920 application, as filed.

4. After such investigation, it was determined that Packer indeed contributed to the conception of features relating to acknowledgment suppression that is embodied in application claim 17 (claim 8 of the '121 patent). Furthermore, on January 16, 1997, after an analysis by Gronski of the features initially claimed and introduced by amendment dated July 31, 1996, applicants also realized that Luxenberg contributed to the invention of application claim 19 (as filed) and that Enns contributed to the invention of dependent claims 44-48, 58, 62 and 67 introduced by amendment[5] on July 31, 1996 in the '920 application.

5. The facts and circumstances that led to the error include (i) the complexity and extent of claimed subject matter in the '920 application (as initially filed[6] and later amended[7]) which made it difficult for Gronski and Moura to discern one inventive aspect from many others when they

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[5] Attachment C.

[6] Attachment A.

[7] Attachment C.

executed the original declaration on April 21, 1995 (i.e., the acknowledgment suppression feature conceived by Packer (application claim 17) and the power management feature conceived by Luxenberg (application claim 19) were only two of 25 initial claims covering multiple claimed features[8] and dependent application claims 44-48, 58, 62 and 67 relating to the shared channel feature developed by Enns were among 61 claims pending after amendment when Moura and Gronski executed the Supplemental Declaration on August 1, 1996), (ii) because Moura rather than Gronski handled matters with patent counsel (Fenwick & West) in supplying information to prepare the original inventorship declaration and Packer and Luxenberg had left assignee's employ (Enns' inventive claims had not then been introduced into the application), patent counsel had no direct source of inventorship information from Gronski or his development team, (iii) because Gronski prepared the description and drawings of Packer's and Luxenberg's conceptions for the initial draft patent application (e.g., these omitted inventors had left assignee's employ when the application was initially drafted), Moura mistakenly believed that Gronski made the conceptions, (iv) for reasons indicated above, Moura mistakenly informed patent counsel (Fenwick & West) that he and Gronski were the only inventors and patent

[8] Other distinctive features which are separately claimed in eight divisional applications include (1) overall architecture, (2) login and channel request algorithms (08/588,378), (3) acknowledge suppression (SN 08/697,080), (4) prioritized polling and credit/done protocols (SN 08/703,767), (5) packet suppression (SN 08/697,079), (6) power level control (SN 08/697,246), (7) operability condition monitoring (SN 08/703,892) and (8) quality-based channel switching (SN 08/700,991).

counsel's contacts with Gronski were technical only rather than administrative, i.e., Gronski had no communications with patent counsel regarding the issue of inventorship but left all administrative matters to Moura and patent counsel and (v) to the extent that Gronski had knowledge of the contributions of Packer, Enns and Luxenberg to any of the subject matter of application claims 17 and 19 when he signed the original declaration and dependent claims 44-48, 58, 62 and 67 when he signed Supplement Declaration, he did so under the mistaken belief that he was signing in the representative capacity for all engineering employees involved and that it was his responsibility and obligation to do so since they had signed over all rights to the invention to assignee.

7. A chronology and description of supporting documentation evidencing the inadvertent error without any deceptive intent on the part of the applicants and assignee are described as follows:

(a) On September 6, 1994, patent counsel requested opening of a case docketing the matter based on a disclosure received from Hybrid on July 14, 1994. (Attachment F) The case docket sheet listed only Moura as the inventor.

(b) On September 16, 1994, Robert L. Packer left the employ of assignee.

(c) On October 20, 1994, Robert Luxenberg left the employ of assignee.

(d) On December 9, 1994, Moura submitted via facsimile descriptive information to patent counsel which included, among other things, the acknowledgment suppression feature of Packer, the automatic gain (power control) feature of Luxenberg and the shared channel feature of Enns. (Attachment G) Prior to this time, Moura and Gronski were busy preparing a written description of the invention for use by patent counsel for completing the patent application. The description of the acknowledgment suppression, power control and shared/dedicated channel features contained in the draft was initially prepared by Gronski but incorporated in the draft patent application of Exhibit G prepared by Moura.

(e) On January 23, 1995, Moura submitted additional disclosure material to patent counsel. (Attachment H)

(f) On February 1, 1995, Rick Fuller, assignee's Vice President of Finance, submitted flow diagrams to patent counsel indicating preparation of acknowledgment suppression and packet suppression diagrams by Moura and Gronski. (Attachment I). It is seen that the algorithms for acknowledgment and packet suppression are closely related.

(g) At least from February 1, 1995 to April 19, 1995, patent counsel diligently worked with Moura and Gronski to prepare the application for filing. In a teleconference on April 19, 1995, Moura informed patent counsel that he and Gronski were inventors and supplied

address information for preparing the inventorship oath. Patent counsel then prepared application papers including the oath.

(h) On April 21, 1995, Moura and Gronski visited patent counsel's office in Palo Alto, California to review the application and to execute the inventorship oath.[9] The meeting with counsel was brief. After execution, the application was filed via express mail on April 21, 1995.

(i) After extensive prosecution, the claims were allowed on September 5, 1996. Original application claims 17 and 19 (patent claims 8 and 9) were amended by an Amendment dated July 31, 1996 to recite the environment of use (e.g., in an interactive asymmetric network conceived by Moura and Gronski) of the acknowledgment suppression feature to which Packer contributed and the power control feature to which Luxenberg contributed. Enns' dependent claims 44-48, 58, 62 and 67 were added via amendment of July 31, 1996.[10] This amendment was sent to Moura for review and handling to obtain Gronski's execution. On August 1, 1996, after review of the July 31, 1996 Amendment, Moura and Gronski executed a Supplemental Declaration[11] that referenced application claims 17 and 19, as well as, new claims 44-48, 58, 62 and 67. For reasons stated in paragraph 5 above, as well as, for reason that applicants believed the

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9 Attachment B.
10 Attachment C.
11 Attachment D.

inventorship issue was resolved and made no further thought or inquiry regarding the same, Gronski and Moura again made the same honest mistake relative to the inventive entity for independent claims 17 and 19, and dependent claims 44-48, 58, 62 and 67 when executing the Supplemental Declaration of August 31, 1996.

(j) On December 17, 1996, the '920 application issued to the '121 patent.

(k) On December 30, 1996, Packer, who at that the time was no longer an employee of assignee, notified Moura of a mistake in the name of the inventive entity.

(l) On January 2, 1997, Moura notified patent counsel of the apparent mistake in naming the inventive entity.

(m) Between January 2, 1997 and the present, patent counsel investigated the question of mistaken inventive entity including conducting conferences in person, by telephone and via e-mail with parties to this petition, and thereafter prepared this petition.

7. Assignee, Hybrid Network, Inc., through its undersigned Vice President, consents to the requested correction of the inventive entity.

8. The errors in naming the inventive entity occurred without any deceptive intent on the part of the applicants and assignee.

9. A new corrected inventorship declaration accompanies this petition naming all five inventors.

10. Applicants request that the inventive entity of the issued '121 patent be corrected to reflect **Eduardo J. Moura, Jan M. Gronski, Robert L. Packer, Frederick Enns and Robert A. Luxenberg**, and that applicants be permitted to correct the inventive entity of all continuation and division applications based on the respective contributions of the respective inventors contributing to the claimed subject matter of the respective applications.

All statements made herein on the basis of our own knowledge are true and correct, and all statements made on information and belief are believed to be true and correct. We understand that willful false statements are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001 and may jeopardize the validity of the referenced patent.

2/11/97
Date

Eduardo J. Moura
Eduardo J. Moura

2/26/97
Date

Jan M. Gronski
Jan M. Gronski

FEB 10, 1997
Date

Hybrid Networks, Inc.
By: Robert Zimmerman, Vice President

FOR UTILITY/DESIGN
CIP/PCT NATIONAL/PLANT
ORIGINAL/SUBSTITUTE/SUPPLEMENTAL
DECLARATIONS

RULE 63 (37 C.F.R. 1.63) DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CUSHMAN FORM

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the INVENTION ENTITLED ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

the specification of which (CHECK applicable BOX(ES))

→ ☐ is attached hereto.

X → ☒ was filed on April 21, 1995 as U.S. Application No. 08/426,920 (now U.S. Pat. 5,586,121)

BOX(ES) ☒ was filed as PCT International Application No. PCT/ PCT/US/96/05453 on April 19, 1996

→→ and (if applicable to U.S. or PCT application) was amended on July 29, 1996 (US) August 12, 1996 (PCT)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56. I hereby claim foreign priority benefits under 35 U.S.C. 119/365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application on which priority is claimed, or (2) if no priority claimed, before the filing date of this application:

PRIOR FOREIGN APPLICATION(S) Number	Country	Day/MONTH/Year Filed	Date first Laid-open or Published	Date Patented or Granted	Priority Claimed Yes	No
					☐	☐
					☐	☐
					☐	☐
					☐	☐

I hereby claim domestic priority benefit under 35 U.S.C. 119/120/365 of the indicated United States applications listed below and PCT international applications listed above or below and, if this is a continuation-in-part (CIP) application, insofar as the subject matter disclosed and claimed in this application is in addition to that disclosed in such prior applications, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56 which became available between the filing date of each such prior application and the national or PCT international filing date of this application:

PRIOR U.S. PROVISIONAL, NONPROVISIONAL AND/OR PCT APPLICATION(S) Application No. (series code/serial no.)	Day/MONTH/Year Filed	Status pending, abandoned, patented	Priority Claimed Yes	No
			☐	☐
			☐	☐
			☐	☐
			☐	☐

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint Lawrence Harbin, Reg. No. 27644, Farkas & Manelli, PLLC, 1233 20th Street, NW, Suite 700, Washington, DC 20036 whose telephone number (202) 778-1139 (to whom all communications are to be directed to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent.

(1) INVENTOR'S SIGNATURE: Eduardo J. Moura Date: Feb 4, 1997

	First	Middle Initial	Family Name
	Eduardo	J.	MOURA
Residence	San Jose	CA	USA
	City	State/Foreign Country	Country of Citizenship
Post Office Address	3509 Mt. Davidson Court, San Jose, CA		
(include Zip Code)	95124		

(2) INVENTOR'S SIGNATURE: Jan M Gronski Date: 2/26/97

	First	Middle Initial	Family Name
	Jan	Maksymilian	GRONSKI
Residence	Palo Alto	CA	USA
	City	State/Foreign Country	Country of Citizenship
Post Office Address	705 Newell Road, Palo Alto, CA		
(include Zip Code)	94303		

(FOR ADDITIONAL INVENTORS, check box ☒ to attach CDC 116-2 same information for each re signature, name, date, citizenship, residence and address.)

DECLARATION AND POWER OF ATTORNEY
(continued)
ADDITIONAL INVENTORS

(3) INVENTOR'S SIGNATURE: [signature] Date: 3/19/97

First	Middle Initial	Family Name
Robert	L	PACKER

Residence	City	State/Foreign Country	Country of Citizenship
	Los Gatos	CA	USA

Post Office Address	16095 Redwood Lodge Road, Los Gatos, CA
(include Zip Code)	95030

(4) INVENTOR'S SIGNATURE: [signature] Date: 3/7/97

First	Middle Initial	Family Name
Robert	A.	LUXENBERG

Residence	City	State/Foreign Country	Country of Citizenship
	Woodside	CA	USA

Post Office Address	156 Alta Vista Road, Woodside, CA
(include Zip Code)	94062

(5) INVENTOR'S SIGNATURE: [signature] Date: 2/26/97

First	Middle Initial	Family Name
Frederick		ENNS

Residence	City	State/Foreign Country	Country of Citizenship
	Menlo Park	CA	USA

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(include Zip Code)	94025

(6) INVENTOR'S SIGNATURE: Date:

First	Middle Initial	Family Name

Residence	City	State/Foreign Country	Country of Citizenship

Post Office Address	
(include Zip Code)	

(7) INVENTOR'S SIGNATURE: Date:

First	Middle Initial	Family Name

Residence	City	State/Foreign Country	Country of Citizenship

Post Office Address	
(include Zip Code)	

(8) INVENTOR'S SIGNATURE: Date:

First	Middle Initial	Family Name

Residence	City	State/Foreign Country	Country of Citizenship

Post Office Address	
(include Zip Code)	

(9) INVENTOR'S SIGNATURE: Date:

First	Middle Initial	Family Name

Residence	City	State/Foreign Country	Country of Citizenship

Post Office Address	
(include Zip Code)	

Rule 56(a) & (b) = 37 C.F.R. 1.56(a) & (b)
PATENT AND TRADEMARK CASES - RULES OF PRACTICE
DUTY OF DISCLOSURE

(a) ...Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the [Patent and Trademark] Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability...(b) information is material to patentability when it is not cumulative and (1) It also establishes by itself, or in combination with other information, a prima facie case of unpatentability of a claim or (2) refers, or is inconsistent with, a position the applicant takes in: (i) Opposing an argument of unpatentability relied on by the Office, or (ii) Asserting an argument of patentability

PATENT LAWS 35 U.S.C.

§102. Conditions for patentability; novelty and loss of right to patent

A person shall be entitled to a patent unless--

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent or

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or

(c) he has abandoned the invention, or

(d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months* before the filing of the application in the United States, or

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent, or

(f) he did not himself invent the subject matter sought to be patented, or

(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

§103. Condition for patentability; non-obvious subject matter

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made. Subject matter developed by another person, which qualified as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person

* Six months for Design Applications (35 U.S.C. 172).

SUPPLEMENTAL DECLARATION PATENT APPLICATION

SOLE/JOINT

As a below named inventor, I hereby declare: THAT I verily believe I am the original, first and sole (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the invention described and claimed in United States Application No. 08/426,920, filed on April 21, 1995 and entitled:

ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD (now U.S. Patent 5,586,121)

that the subject matter of claim(s) Nos. 1-61 of U.S. Patent 5,586,121

x one) [ ] per Amendment filed _____

box only) [ ] as allowed _____

was part of my or our invention and was invented before the filing of the original application, above identified, and of its parent application(s) (if this is a continuing application thereof) for such invention; that I have reviewed and understand the contents of the specification, including (to the best of my ability) the claim(s), as above amended/allowed; that I acknowledged my duty to disclose all information known to me to be material to patentability of this application (including, if this is a CIP, in so far as the subject matter disclosed and claimed in this application is in addition to that disclosed in said parent application(s), my duty to disclose all information known to me to be material to patentability which became available between the filing date of said parent application(s) and the national or international filing date of this application) in accordance with 37 C.F.R. 1.56.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

(1) Inventor's Signature Eduardo J. Moura Date Feb 4, 1997

Inventor's Name(typed) Eduardo (First) J. (Middle Initial) MOURA (Family Name)

(2) Inventor's Signature Jan M. Gronski Date 2/26/97

Inventor's Name(typed) Jan (First) M. (Middle Initial) GRONSKI (Family Name)

(3) Inventor's Signature [illegible] Date 3/19/97

Inventor's Name(typed) Robert (First) L. (Middle Initial) PACKER (Family Name)

(4) Inventor's Signature [illegible] Date 2/26/97

Inventor's Name(typed) Frederick (First) Middle Initial ENNS (Family Name)

(5) Inventor's Signature [illegible] Date 3/7/97

Inventor's Name(typed) Robert (First) A. (Middle Initial) LUXENBERG (Family Name)

EXHIBIT A

What is claimed is:

1. ~~A hybrid access system for connecting at least a single client data~~ processor with a network, comprising:

a local area network (LAN) system;

a hybrid system manager connected to said LAN system;

a downstream router connected to said LAN system for transmitting information;

an upstream router connected to said LAN system for receiving information, said upstream bridge router including a Hybridware™ server,

a broadcast unit connected to said downstream router;

a downstream channel connected to said broadcast unit for high speed transmission of information on said high speed downstream channel;

an independent upstream channel connected to said upstream router, which operates at a lower speed than said downstream channel;

at least a single remote link adapter connected to said upstream and downstream channels; and

a corresponding at least a single client data processor connected to said ~~remote link adapter.~~

2. The hybrid access system according to claim 1, wherein said independent upstream channel includes a telephone network.

EXHIBIT 4

3. The hybrid access system according to claim 1, wherein said independent upstream channel includes a cable TV network.

4. The hybrid access system according to claim 1, wherein said independent upstream channel includes a wireless transmission path.

~~5. The hybrid access system according to claim 1, wherein said LAN system includes a LAN switch and a router.~~

6. The hybrid access system according to claim 1, wherein said broadcast unit includes at least one of a group consisting of a cable TV headend, a wireless TV transmitter, a satellite transmitter and a cell site.

7. A method of accessing a wide area network from any of a plurality of client processors each connected to an asymmetric hybrid network including high-speed downstream and lower-speed upstream channels controlled by a hybrid system manager and a router server, including the steps of:

providing a polling signal from a hybrid system manager to client processors,

issuing an upstream channel connection request by lower speed channel, if no upstream data channel is currently assigned to a client data processor,

conducting login communications between the router server and the system manager,

verifying authorized user status at the system manager level,

allocating an upstream channel by high speed downstream channel message, and

sending upstream data over the allocated lower speed upstream channel of the asymmetric hybrid access network.

8. The method according to claim 7, wherein providing a polling signal includes polling clients in an idle state at a selected frequency level of polling.

9. The method according to claim 7, wherein providing a polling signal includes polling clients in a blocked state at a selected frequency level of polling.

10. The method according to claim 7, wherein providing a polling signal includes polling clients in a non-responsive state at a selected frequency level of polling.

11. The method according to claim 7, wherein providing a polling signal includes polling clients in idle and blocked states at selected first and

second frequency levels of polling, and polling of clients in an idle state occurs more frequently than polling of clients in a blocked state.

12. The method according to claim 7, wherein providing a polling signal includes polling clients in idle and non-responsive states at selected first and second frequency levels of polling, and polling of clients in an idle state occurs more frequently than polling of clients in a non-responsive state.

13. The method according to claim 7, wherein idle clients are polled multiple times during a poll cycle and polling of blocked and non_resp clients is distributed evenly over a poll cycle to assure that the latency for acquiring a channel for idle units is uniform.

14. The method according to claim 7, wherein polling includes grouping clients by state and polling within each group round robin.

~~15. A method of high speed remote access of a wide area network~~ from any of a plurality of client processors each connected to an asymmetric hybrid network including high-speed downstream and lower-speed upstream channels controlled by a hybrid system manager and a router server, including the steps of:

issuing an upstream channel authorization request by lower speed channel, for upstream data channel currently used by a particular client data processor,

conducting login communications between the router server and the system manager,

verifying authorized user status at the system manager level,

authorizing specific upstream channel use by high speed downstream channel message, and

sending upstream data over the allocated lower speed upstream channel of the asymmetric hybrid access network.

16. A method of high speed remote access of a wide area network from any of a plurality of client processors each connected to an asymmetric hybrid network including high-speed downstream and lower-speed upstream channels controlled by a hybrid system manager and a router server, including the steps of:

sending a new client message to a plurality of hybrid routers, which provides client names,

broadcasting a poll message to a plurality of clients using client names,

recognizing a client name,

providing a poll response,

receiving a poll response,

reporting a client found to a system manager,

ceasing polling,

providing an address to the client which responded to poll,

receiving the address sent, and

configuring the client with the address provided.

17. A method of transmitting data from an upstream transmit queue in an upstream transmitter node to a selected receiver node, comprising the steps of:

transmitting selected amounts of data from a transmit queue in a first node to a second node,

generating acknowledgments of data received by said second node,

eliminating from the transmit queue of the second node data acknowledgments which are redundant of other acknowledgments in said second transmit queue, and

filling open transmit queue spaces with additional data.

18. A method of determining polling frequency from an upstream communications mode of a hybrid access system with respect to a plurality of downstream nodes having polling status levels corresponding to activity states in which a remote link adapter may be set, comprising the steps of:

determining the priority status of predetermined remote link adapters in a hybrid access system; and

polling the remote link adapter having the highest priority status level.

19. A method of setting remote link adapter power level in a hybrid access system, comprising the steps of:

transmitting successive indications to a hybrid upstream router at selected different power levels,

confirming receipt of a first power level indication, and

setting the level of future transmissions to a power associated with confirmation of receipt.

20. A method of packet suppression in communication between first and second nodes having respective first and second transmit and receive queues, in which information packets having headers are transmitted from said first node to said second node, comprising the steps of:

loading the transmit queue of said first node with a first information packet;

loading a second information packet into the transmit queue of said first node;

checking the headers of said first and second information packets, and

suppressing one of said first and second information packets, if the headers are the same.

21. A method of credit administration between first and second computer nodes, for information amounts having predetermined information credit values, comprising the steps of:

sending a credit to a first computer node, which sets a response frequency;

receiving an information amount corresponding in value up to the amount of the credit received at said first computer node at said response frequency; and

sending a done signal to said second computer node indicative of the credit received less the amount of information received.

22. A method of operating a client node, comprising the steps of:

sending periodic operability indication messages during an active state,

receiving a poll message, and requesting channel connection.

23. A method of operating a server node, comprising the steps of:

receiving periodic operability indication messages during an active state,

sending a polling message, when a threshold interval has expired,

awaiting a poll response, and

entering a non-responsive state if response to polling is received.

~~24. A method of responding to detected quality levels in a~~ communication channel, comprising the steps of:

detecting a quality characteristic with respect to a selected communication channel from a selected group of quality characteristics each which is defined by quantitative levels,

determining whether the quantitative level of the detected quality characteristic deviates with respect to a predefined norm, and

switching to another communication channel, if sufficient deviation is ~~determined~~.

25. The method ~~according~~ to claim 24, wherein said group of quality characteristics ~~includes~~ time from last operability indication, signal to noise ~~ratio, and error frequency.~~

Add B7

EXHIBIT B

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

ORIGINAL, CONTINUATION OR DIVISIONAL

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

ASYMMETRIC HYBRID ACCESS SYSTEM AND METHOD

the specification of which (check one):

[X] is attached hereto.

[ ] was filed on: _____
Application Serial No.: _____
and was amended on: _____ (if applicable)

[ ] was described and claimed in PCT International Application No. _____
filed on: _____
and as amended under PCT Article 19 on: _____

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) on which priority is claimed:

Prior Foreign or PCT Application(s): n/a

Application Number	Country (or indicate if PCT)	Day/Month/Year Filed	Priority Claimed? Yes	No
			[ ]	[ ]
			[ ]	[ ]

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:

Prior U.S. Application(s) or PCT International Application(s) Designating the U.S. for Benefit Under 35 USC §120: n/a

U.S. Application Serial No.	U.S. Filing Date	Patented	Pending	Abandoned

PCT Applications Designating the U.S.:

PCT Application No.	PCT Filing Date	U.S. Serial Nos. Assigned (if any)	Patented	Pending	Abandoned

Case Docket No. 1572

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Judson D. Cary, Reg. No. P-38,097
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SEND CORRESPONDENCE TO:	DIRECT TELEPHONE CALLS TO: (name and telephone number)
Robert P. Sabath FENWICK & WEST Two Palo Alto Square, Suite 500 Palo Alto, CA 94306	Robert P. Sabath (415) 858-7153

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

1-0

Full Name of Inventor: Eduardo J. Moura

Signature: Eduardo J. Moura Dated: 4/21/95

Residence: 3509 Mt. Davidson Court, San Jose, CA 95124 Citizenship: U.S.A.

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2-0

Full Name of Inventor: Jan Maksymilian Gronski

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Post Office Address: same as residence

Case Docket No. 1572

EXHIBIT C

429-202
539-203
55-215

2603

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Applicants: Eduardo J. Moura, et al.

Serial No.: 08/426,920 : Examiner S. Hom

Filed: April 21, 1995 : Art Unit:2603

For: Asymmetric Hybrid Access System and Method

8-15-96

Date: July 31, 1996

A M E N D M E N T

In reply to the Official Action mailed April 3, 1996, please amend the above-identified application as follows:

IN THE ABSTRACT

Please withdraw the original Abstract of the Disclosure on page 41, and substitute the new Abstract of the Disclosure, submitted herewith.

IN THE SPECIFICATION

Page 11, line 18, change "28" to --28'--.

Page 12, line 2, change "28" to --28'--;
line 12, change "5" to --26--;and
line 19, change "5" to --26-- .

Page 15, line 15, insert --a-- after "which";
insert --is-- after "or";
line 16, insert --,-- after "3c"; and
line 19, insert --the-- before "HAS".

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03 143.00CR

B

Page 19, line 18, insert --no-- before "application";
line 19, after "direction" insert --, the state is idle.--; and
line 20, after "message" insert --from a client--.

Page 21, line 14, change "allocation" to --available--.

Page 23, line 13, change "72a and 72b" (first occurrence) to --73a and 73b--.

Page 28, line 8, change "Mi" (first occurrence) to --Mi+1--

Page 31, line 8, change "a" to --an--.

IN THE CLAIMS

Re-write claims 1, 5, 6, 15, 17, 19, 20, 24 and 25 as follows:

1. (Amended) A hybrid access system for [connecting] communication with at least a single data processor [with] in a network, said system comprising:

a local area network [(LAN) system] which includes a shared medium;

a hybrid system manager [connected to said LAN system] in communication with said local area network for transmitting information over said shared medium and for interactively handling transfers of information thereover in accordance with a high speed downstream channel protocol and transfers of lower speed return information in accordance with an upstream channel protocol;

a downstream router [connected to said LAN system] in communication with said local area network for transmitting information over said shared medium;

an upstream router [connected to said LAN system] in communication with said local area network for receiving information, ~~said upstream router including a Hybridware server,~~ Hybridware SM

a broadcast unit connected to said downstream router, said broadcast unit being capable of point-to-multipoint broadcast links on said local area network;

a downstream channel [connected to] in communication with said broadcast unit for high speed transmission [on a first medium on said high speed downstream channel] to ~~at least a single data processor~~ said single data processor in communication with said shared medium;

an independent upstream channel [connected to] in communication with said upstream router, for transmission of information from said data processor [which operates] at a lower speed than transmission of information on said downstream channel;

at least a single remote link adapter [connected to] associated with said data processor and being in communication with said upstream and downstream channels; and

[a corresponding] at least a single client data processor [connected to] in communication with said remote link adapter.

5. (Amended) The hybrid access system according to claim 1, wherein said [LAN system] local area network includes a

[LAN] switch and said ~~at least one of a~~ downstream router and said ~~an~~ upstream router.

Claim 6, line 3, change "or" to -and--.

~~18~~ 7. (Amended). [A] In a wide area network that includes a host server, a plurality of remote clients, a headend facility, a high speed interface that connects said headend facility with said host server, and a high speed link for transferring downstream data packets, a method of providing high speed remote access [of a wide area network] from any of a plurality of client processors each connected to said wide area network ~~said asymmetric [hybrid] network~~ including high-speed downstream and lower-speed upstream channels controlled by a hybrid system manager and a router [server], said method including the steps of:

providing ~~a downstream channel~~ said downstream channel that is shared by said plurality of remote clients,

providing at least one independent upstream channel that enables at least one of said remote clients to transmit lower speed return data packets to said host server,

issuing an upstream channel authorization request by a lower speed channel for an upstream data channel currently used by a particular client data processor,

conducting login communications between the router [server] and the system manager,

verifying authorized user status at the system manager [level],

authorizing specific upstream channel use by high speed downstream channel message, and

sending upstream data over an allocated lower speed upstream channel of the asymmetric [hybrid access] network.

17. In a full-duplex asymmetric network communication system for transferring information between a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of ~~said downstream channel~~ the downstream channel, and wherein said network communication system includes a hybrid access system for providing interactive network sessions in downstream and upstream communication channels, a [A] method of transmitting data from an upstream transmit queue in an upstream transmitter node to a selected receiver node located at a receiving end, said method comprising the steps of:

transmitting selected amounts of packet data from ~~a transmit queue~~ a first transmit queue in a first node to a second node wherein said second node includes ~~a transmit queue~~ a second transmit queue for transmitting acknowledgments to a receiver node,

generating acknowledgments of packet data received by said second node,

eliminating from the second transmit queue of the second node packet data acknowledgments which are redundant of other packet data acknowledgments in said second transmit queue, and

filling open transmit queue spaces with additional packet data.

9
~~19.~~ (Amended) In a full-duplex asymmetric network communication system for transferring information between a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of ~~said downstream channel~~ the downstream channel, and wherein said network communication system includes a hybrid access system for providing an interactive network session in downstream and upstream communication channels, a [A] method of dynamically setting remote link adapter power [level] levels ~~in~~ [a] said hybrid access system, comprising the steps of:

transmitting successive indications to a hybrid upstream router at selected different power levels,

confirming receipt of a [first power level indication] selected one of said indications,
and

setting [the] a level of future transmissions to a power level associated with [confirmation of receipt] the selected indication.

10
~~20.~~ (Amended) In a full-duplex asymmetric network communication system for transferring information from a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said

shared medium and for transmitting lower speed return information over an upstream channel that is independent of ~~said downstream channel~~ the downstream channel, and wherein said network communication system includes a hybrid access system for providing an interactive network ~~sessions~~ session in downstream and upstream communication channels, a [A] method of packet suppression in communication between first and second nodes in said communication system having respective first and second transmit and receive queues, in which information packets having headers are transmitted from said first node to said second node, comprising the steps of:

loading [the transmit queue of said first node with] a first information packet into the transmit queue of said first node;

loading a second information packet into [a] the transmit queue of said first node;

checking the headers of said first and second information packets, and responsive to redundancy between ~~said first and second headers~~ the first and second headers, suppressing one of said first and second information packets [, if the headers are the same].

~~24.~~ 11 (Amended) In a full-duplex asymmetric network communication system for transferring information from a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of ~~said downstream channel~~ the downstream channel, and wherein said network communication system includes a hybrid access system for

simultaneously controlling the downstream and upstream in interactive network sessions, a [A] method of dynamically responding to detected quality levels in a communication channel, comprising the steps of:

detecting a quality characteristic with respect to a selected communication channel from a selected group of quality characteristics each of which is defined by quantitative levels,

determining whether the quantitative level of the detected quality characteristic deviates with respect to a predefined norm, and

dynamically switching to another communication channel, if sufficient deviation is determined.

12 11
~~25.~~ (Amended) The method according to claim [25] ~~24~~ wherein said group of quality characteristics includes time from last operability indication, signal to noise ratio, and error frequency.

Insert new claims 26-74, as follows:

13
--~~26.~~ A network communication system including a server, a plurality of remote clients and an information distribution facility for distributing information signals to said remote clients, said communication system comprising:

a downstream channel that is shared by said plurality of remote clients so as to enable said plurality of remote

clients to receive high speed data packets from said server over a shared medium,

at least one independent upstream channel for enabling at least one of said remote clients to transmit lower speed return data packets to said server,

a hybrid access system including a network manager for interactively controlling both transfers of data packets from said server to said remote clients via broadcasts over said shared downstream channel in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over said independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said server and said plurality of remote clients, and

said hybrid access system further includes a server interface that enables communication with said server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared media and an upstream router for receiving return data packets from said remote clients.

14 the 13
27. ~~A~~ network communication system as recited in claim ~~26~~ wherein said plurality of remote clients include remote link adapters and said downstream router couples said shared medium to establish a physical connection with said downstream channel and said upstream router couples said remote link adapters to establish a physical connection with said upstream channel.

15 the 13
28. ~~A~~ network communication system as recited in claim ~~26~~ wherein said independent upstream channel lies in a

communication medium that is different from said downstream channel.

16 ~~29.~~ The ~~A~~ network communication system as recited in claim ~~26~~ 13 wherein said shared medium comprises a hybrid fiber coaxial cable and said remote clients physically connect in parallel to said hybrid fiber coaxial cable to receive simultaneously broadcasted data packets whereby to facilitate efficient sharing of resources at said distribution facility by said remote clients.

17 ~~30.~~ The ~~A~~ network communication system as recited in claim ~~29~~ 16 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

18 ~~31.~~ The ~~A~~ network communication system as recited in claim ~~30~~ 17 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

19 ~~32.~~ The ~~A~~ network communication system as recited in claim ~~30~~ 17 wherein said at least one independent upstream channel comprises an independent lower speed channel transmitted over said hybrid fiber coaxial cable, and said upstream router receives said data packets transmitted by said at least one remote client over said independent upstream channel and routes said data packets to said server.

20 ~~33.~~ The ~~A~~ network communication system as recited in claim ~~26~~ 13 wherein said distribution facility comprises a cellular broadcast facility, said shared medium comprises radio frequency broadcasts from said cellular broadcast facility, and said remote clients each comprise radio frequency

receivers for substantially simultaneously receiving data packets transmitted over said shared medium so as to provide sharing of resources at said distribution facility by said remote clients.

d 21 ~~24~~. The ~~A~~ network communication system as recited in claim ~~33~~ 20 wherein said at least one independent upstream channel comprises a lower speed cellular return channel routed through said distribution facility.

d 22 ~~25~~. The ~~A~~ network communication system as recited in claim ~~26~~ 13 wherein said distribution facility comprises a satellite, said shared medium comprises a direct satellite broadcast and said remote clients includes a receiver for substantially simultaneously receiving information signals from said broadcast so as to provide sharing of broadcast resources among said remote clients.

d 23 ~~30~~. The ~~A~~ network communication system as recited in claim ~~35~~ 22 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

d 24 ~~27~~. The ~~A~~ network communication system as recited in claim ~~26~~ 13 wherein each of said upstream and downstream channels lies in a communication medium selected from one of a CATV distribution network, a cell site, a radio transmitter station, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

d 25 ~~28~~. The ~~A~~ network communication system as recited in claim ~~26~~ 13 wherein said distribution facility comprises a television broadcast facility, said shared medium comprises radio frequency broadcasts from said television broadcast

44

facility, and said remote clients include radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium whereby to provide sharing of resources located at said distribution facility.

d 26 ~~39~~. The ~~A~~ network communication system as recited in claim ~~38~~ 25 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

d 27 ~~40~~. The ~~A~~ network communication system as recited in claim ~~39~~ 26 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

d 28 ~~41~~. The ~~A~~ network communication system as recited in claim 13 ~~26~~ wherein said distribution facility comprises a radio broadcast facility, said shared medium comprises radio frequency broadcasts from said radio broadcast facility, and said remote clients include radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium whereby to provide sharing of resources located at said distribution facility.

d 29 ~~42~~. The ~~A~~ network communication system as recited in claim ~~41~~ 28 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

d 30 ~~43~~. The ~~A~~ network communication system as recited in claim ~~42~~ 29 wherein said at least one independent upstream channel

comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

31. The network communication system as recited in claim 17 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

32. The network communication system as recited in claim 19 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

33. The network communication system as recited in claim 26 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel whereby to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

34. The network communication system as recited in claim 29 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to

demand by respective remote clients communicating with said shared medium.

35 ~~48~~. The ~~A~~ network communication system as recited in claim 24 ~~37~~ wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

36 ~~49~~. The ~~A~~ network communication system as recited in claim 13 ~~26~~ wherein said distribution facility comprises a television broadcast facility, said shared medium comprises radio frequency broadcasts from said television broadcast facility, and said remote clients include radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium so as to provide sharing of resources located at said distribution facility.

37 ~~50~~. The ~~A~~ network communication system as recited in claim 36 ~~49~~ wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

38 ~~51~~. The ~~A~~ network communication system as recited in claim 36 ~~49~~ wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

39 ~~52~~. In a split-channel asymmetric network communication system including a host server, a plurality of remote clients and a headend facility for distributing information

signals to said remote clients, a full-duplex packet delivery system comprising:

a downstream channel that is shared by said plurality of remote clients for receiving high speed data packets from said host server over a shared medium,

at least one independent upstream channel that enables at least one of said remote clients to transmit lower speed return data packets to said host server,

a hybrid access system including a network manager for controlling transfers of data packets from said host server to said remote clients via broadcasts over said shared medium in accordance with a high speed downstream channel protocol ~~and~~ for controlling transfers of lower speed return data packets from said at least one remote client to said host server over said independent upstream channel in accordance with an upstream channel protocol and in accordance with scheduling information transmitted on the downstream channel, said network manager being further operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients,

said hybrid access system further including a backbone interface that enables connection with said host server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared ~~medium~~ medium and an upstream router for receiving return data packets from said at least one of said remote clients,

whereby said network communication system provides full-duplex interactive asymmetric communication in a session between said host server and said plurality of remote clients over ~~a shared communication medium~~ said shared medium.

40 39
~~53~~. The invention as recited in claim ~~52~~ wherein said network manager schedules assignment of upstream channels for use by said at least one remote client in accordance with at least one of an upstream channel availability signal, a priority status signal, a shared/dedicated channel request signal, or a service level authorization signal.

41 39
~~54~~. The invention as recited in claim ~~52~~ wherein communication media for each of said downstream and said upstream channels is selected from at least one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

42 41
~~55~~. The invention as recited in claim ~~54~~ wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel.

43
~~56~~. A network communication system including a host, a plurality of remote users and an information distribution facility for distributing information signals to said remote users, said system comprising:

a downstream channel shared by said remote users for receiving digital information signals transmitted from the host over a shared medium at a high speed,

at least one independent upstream channel for permitting the remote users to transmit digital information to said host at a lower speed than the high speed on the downstream channel,

a hybrid access system for interactively controlling transfers of digital information from said host to the

remote users via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and for controlling transfers of digital information from said remote clients to said host at said lower speed over said at least one independent upstream channel in accordance with an upstream channel protocol, said hybrid access system being operable to provide full-duplex point-to-multipoint communication between said host and said remote users, and

said hybrid access system further including an interface for connecting with the host, a downstream router for enabling transmission of high speed information to said remote users over said shared medium and an upstream router for receiving return information from said remote users.

44. The ~~57. A~~ network communication system as recited in claim ~~56~~ 43 wherein communication media for each of said downstream and said upstream channels is selected from one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

45. The ~~58. A~~ network communication system as recited in claim ~~57~~ 44 wherein said upstream channel protocol enables operation of said upstream channel at multiple speed and said hybrid access system selectably controls speeds of data transfers on said upstream channel.

46. ~~59.~~ A network communication system including a host server, a plurality of remote clients and a headend facility for distributing data packets to said remote clients, said system comprising:

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a downstream channel that is shared by said plurality of remote clients for receiving high speed data packets from said host server over a shared medium,

at least one independent upstream channel that permits said remote clients to transmit lower speed return data packets to said host server,

a hybrid access system including a network manager for controlling transfers of data packets from said host server to said remote clients via broadcasts over said shared medium in accordance with a high speed downstream channel protocol, and for controlling transfers of lower speed return data packets from said remote clients to said host server over an independent upstream channel located on a physical medium that is different from shared medium of said downstream channel, said upstream communication channel being assigned in accordance with an upstream channel protocol and scheduling information transmitted on the downstream channel, said network manager being further operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients,

said hybrid access system further including a backbone interface that enables connection with said host server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

60. The network communication system as recited in claim 59 wherein said hybrid access system effects control of assignment of upstream channels to said remote clients in accordance with scheduling information including a dedicated

or shared channel request signal, a channel availability signal, a priority status signal or class of service signal.

48 The 47
61. ~~A~~ network communication system as recited in claim ~~60~~ wherein communication media for each of said downstream and said upstream channels is selected from one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

49 The 48
62. ~~A~~ network communication system as recited in claim ~~61~~ wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel.

50
63. A client-server system including a split-channel asymmetric network for enabling multiple users to share information, said system comprising:

a host server,

a plurality of remote users,

a distribution facility for distributing information signals to said remote users,

a downstream channel that is shared by said plurality of remote users so as to enable said plurality of users to receive high speed data packets from said host server over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote users to

transmit return data packets to said host server at a lower speed than a data packet rate transmitted in said downstream channel,

a hybrid access system for interactively controlling both transfers of data packets from said host server to said remote users via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote users to said host server over an independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote users in an interactive session wherein transmission of upstream information is controlled, in part, by control information transmitted over said downstream channel, and

said hybrid access system further including a host interface that enables communication with said host server, a downstream router for enabling transmission of high speed data packets to said remote users over said shared medium and an upstream router for receiving return data packets from said remote users.

64. In combination with a multi-user computer system including at least one host computer and a plurality of remote clients, the improvement comprising:

a packet distribution facility connected with said host computer for distributing data packets from said host computer to said remote clients,

a downstream channel that is shared by said plurality of remote clients so as to enable said plurality of remote clients to receive high speed data packets from said host server over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote clients to transmit return data packets to said host server at a speed that is lower than a data packet rate transmitted in said downstream channel,

a hybrid access system including a network manager for interactively controlling both transfers of data packets from said host server to said remote clients via broadcasts over said shared medium that communicates with said plurality of remote clients in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over said independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients, and

said hybrid access system further including a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

52

~~55~~. In combination with a CATV broadcast transmission facility including a shared medium downstream channel that is shared by a plurality of remote clients to receive high speed data packets from a host server, the improvement comprising:

respective RLA devices associated with said remote clients that are connected with said shared medium and tuned so as to receive high speed transfers of data packets for conveyance to said remote clients,

54

at least one independent upstream channel that enables said remote clients to transmit lower speed return data packets to said host server,

a hybrid access system including a network manager for interactively controlling both transfers of information data packets from said host server to said remote clients via broadcasts over said shared medium that communicates with said plurality of remote clients in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over said independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients in an interactive session wherein transmission of upstream information is monitored or controlled, in part, by control information transmitted through said downstream channel, and

said hybrid access system further including an interface that enables connection with said host server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared ~~media~~ medium and an upstream router for receiving return data packets from said remote clients,

whereby said improvement acts to provide full-duplex interactive asymmetric communication in a session between ~~a host server~~ said host server and ~~a plurality of remote clients~~ said plurality of remote clients through ~~a CATV network~~ said CATV broadcast transmission facility over ~~a shared communication medium~~ said shared medium.

~~66.~~ 53. The network communication system as recited in claim ~~65~~ 52 wherein communication media for each of said downstream and said upstream channels is selected from one of a CATV

distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

54 ~~57~~. The ~~A~~ network communication system as recited in claim 53 ~~56~~ wherein said upstream channel protocol enables operation of said upstream channel at multiple speed and said hybrid access system selectably controls speeds of data transfers on said upstream channel.

55 ~~58~~. In combination with a television signal broadcast facility, the improvement comprising:

a host computer,

a plurality of remote clients,

a packet distribution facility connected with said host computer for distributing data packets from said host computer to said remote clients,

a downstream channel that is shared by said plurality of remote clients so as to permit said plurality of remote clients to receive high speed data packets from the host server ~~said host server~~ over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote clients to transmit return data packets to said host server at a lower speed than a data packet rate transmitted in said downstream channel,

a hybrid access system including a network manager for controlling transfers of data packets from said host server to said remote clients via broadcasts over said shared

medium in accordance with a high speed downstream channel protocol and for receiving transfers of lower speed return data packets from said remote clients to said host server over an independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients, and

said hybrid access system further including a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

56. In combination with a television signal broadcast facility, a network of host computers and a plurality of remote clients, the improvement comprising:

a packet distribution facility connected with said host computer for distributing data packets from said host computer to said remote clients,

a downstream channel that is shared by said plurality of remote clients so as to enable said plurality of remote clients to receive high speed data packets from ~~said host server~~ the host server over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote clients to transmit return data packets to said host server at a lower speed than a data packet rate transmitted in said downstream channel,

a hybrid access system including a network manager for controlling both transfers of data packets from said host server to said remote clients via broadcasts over said

shared medium in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over an independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients, and

said hybrid access system further including a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

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70. In an asymmetric network communication system including a host server and a plurality of remote clients wherein respective remote clients have associated remote link adapters that operate in accordance with predefined downstream and upstream protocols, said system including:

a headend facility that distributes information signals,

a downstream channel that is shared by said plurality of remote clients so as to permit said plurality of remote clients to receive ~~high~~ high speed information signals from said host server over a shared medium,

at least one upstream channel that is independent of said downstream channel to enable at least one of said remote clients to transmit return information signals to said host server at a lower speed than said information signals transmitted over said downstream channel,

a hybrid access system for controlling transfers of information signals transmitted from said host server to said remote clients over said shared medium in accordance with said downstream protocol and for monitoring communication over said independent upstream channels thereby to provide interactive communication between said host server and at least one of said plurality of remote clients over said downstream and upstream communication channels, and

said hybrid access system further including a backbone interface that enables connection with said host server, a downstream router for enabling transmission of high speed information to said remote clients over said shared media,

whereby said asymmetric network communication system provides ~~full-duplex~~ interactive asymmetric communication between ~~a host server~~ said host server and said at least one of said plurality of remote clients in a shared medium environment.

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M. A packet delivery system for use in an asymmetric network to provide full-duplex communication, said system including a host server and at least one remote client that has a remote link adapter operating in accordance with a high speed downstream and a lower speed upstream protocol, said packet delivery system comprising:

a downstream channel that is shared by said at least one remote client so as to enable said at least one remote client to receive high speed data packets from said host server over a shared medium,

at least one independent upstream channel that enables said remote client to transmit lower speed return data packets to said host server,

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a hybrid access system ~~including~~ for controlling transfers of data packets from said host server to said remote client over said shared medium in accordance with said downstream channel protocol and for monitoring communication over said independent upstream channel thereby to schedule upstream communication in accordance with predefined rules, and

said hybrid access system further including an interface that enables connection with said host server and a downstream router for enabling transmission of high speed ~~data~~ packets to said remote client over said shared media.

59. The packet delivery system as recited in claim 58 wherein said hybrid access system effects control of assignment of upstream channels to said remote client so as to assign either a shared channel or dedicated channel to a remote client.

60. The packet delivery system as recited in claim 59 wherein said hybrid access system effects switching of channel assignments among said remote client between shared and dedicated upstream channels.

61. The method as recited in claim 7 further including the step of providing said independent upstream channel on a medium different from a physical medium of said downstream channel.--

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REMARKS

Claims 1-6, 15, 17, 19-20 and 24-25 remain in the application for reconsideration. New claims 26-74 are being added for additional consideration. Applicants' counsel has

exercised care so as to avoid the introduction of new matter in contravention of 35 U.S.C.§132.

Informalities

Regarding the information disclosure statement, applicants hereby provide copies of missing references;

USP 4,894,789 to Yee
USP 4,987,486 to Johnson et al.
USP 5,014,125 to Pocock et al.
USP 50051,822 to Rhodes
USP 5,093,718 to Hoarty et al.

In terms of relevance to the claimed subject matter, the above references disclose video-on-demand systems, or the like, which do not teach the combination of elements claimed in this application, and in respect of particular claims, the above references do not disclose a hybrid access system or network manager that establishes and manages network sessions for transmitting packetized data and the like over asymmetric forward and return channels operating at different speeds. In addition, none of the above references appears more relevant than the art cited and applied by the examiner.

A PTO form 1449 listing these references is attached.

We have also reviewed the lengthy specification and have corrected minor typographical errors, as requested.

A supplemental declaration is also attached to address the examiner's objections to the initialed interlineations appearing in the original application (Fig. 7 and claim 1) and to address the amended and new claims introduced herein.

Regarding the suggested Sec. 112, second paragraph, discussion of claims 1, 5, 17 and 19, we've made certain amendments touching the examiner's concerns. We also made other changes in an effort to particularly point out and clearly define the invention over the art.

Rejection Under 35 U.S.C. §102(b)

Substantively, the examiner has rejected claims 17, 19, 20 and 24-25 under 35 U.S.C. Sec. 102(b) as being unpatentable over McMullan, Jr. et al. As discussed herein, we traverse this rejection on the basis of certain amendments to the claims and for reason that McMullan Jr., et al. (hereafter "McMullan") does not exactly disclose "each and every" element or the technical substance of the claims as they previously stood and as currently amended. We explain below.

There appears to be a fundamental mistake as to what McMullan shows. For a reference to become statutory under Sec. 102, it must disclose "each and every" element of the claimed invention. Otherwise, it can only be applied under Sec. 103. Clearly absent from McMullan, even before making any amendment, is the provision of an acknowledgment queue located at a "transmitting node" of the network. Instead, McMullan deals with multiple message queues located at a "receiver node" that are simultaneously routed to message queues also located at the receiver node. It is stated in the Official Action, for example, that McMullan recites "the message queue for buffering the data packets for transmission to a system manager and filtering out prior transmission to the system manager by matching address and discarding duplicate data . . ." Perhaps it was not clear that the invention, as claimed, places the acknowledgment queue at a transmitting node. This is clearly different from what McMullan discloses. For this reason, among

others, McMullan does not show the same kind of redundancy filtering that is performed by the claimed invention.

Further, there is another distinction that disqualifies McMullan as a reference under Sec. 102. McMullan does not, for example, discard redundant "information" packets. Instead, he discards information that is duplicative of other information which a device has previously sent to a message queue. This is clearly different from suppressing the transmission of redundant packets about to be transmitted a transmit queue, as claimed. For instance, at col. 29, line 49, of McMullan it is stated that if "a matching terminal address is found, then the duplicate [information] will be discarded." The "terminal address" here refers to the address in the queue associated with the device. McMullan, at col. 30, line 1, further indicates that device information is formed into packets and then forwarded to a "system manager." All of this activity occurs at the receiving end of the system—and not in preparation of transmission of non-redundant data packets. Thus it is abundantly clear by the description at col. 30, lines 8-16, that McMullan simply provides for removal of packets at the receiving end after receipt of an acknowledgment, and not the removal of a redundant contained in a transmit queue.

Quite distinctively, the present invention deals with suppression (removal) of messages at a transmit queue prior to their being actually transmitted. Queuing the packets (or acknowledgments) prior to transmission introduces some latency in the transmission path but overall throughput is improved in noisy channels. In operation, information contained an acknowledgment received at the transmitting end is analyzed to determine whether the content of a soon-to-be-transmitted packet was earlier received or acknowledged. This is evident when operating in TCP/IP sessions where the present invention accounts for sequence numbers to assess redundancy in data packets since new acknowledgments that

contain additional information that may supersede prior acknowledgments. If the content was already acknowledged, the packet (or acknowledgment) is suppressed to make room for other packets to enter the transmit queue. This scheme is not shown or taught by McMullan.

Although the examiner has also applied McMullan to claim 19, we find nothing in McMullan and the examiner has pointed to no specific disclosure therein, as required by 37 CFR 1.106(b), pertaining to the deployment of a power calibration scheme in an interactive network environment. In addition, we do not find disclosure of successive "transmission of . . . different power levels," "confirming of receipt of [power level] indications," or "setting . . . of power levels," as recited in the claims. Also, no routers are disclosed in McMullan. In contrast with the claim language, the power calibration techniques set forth at cols. 45-46 of McMullan are "manually" initiated, rather than being "dynamically" performed, as recited in claim 19. For these reasons, and others, McMullan is clearly inadequate as an anticipatory reference under 35 U.S.C. Sec. 102(b). Accordingly, the rejection must be withdrawn.

We also assert that McMullan cannot properly be applied to claim 24 or 25 under 35 U.S.C. Sec. 102(b). Apart from the lack of deployment in McMullan of an interactive network session, as suggested in the patent claims, there is further no showing of "detecting a quality characteristic," determining whether the . . . detected quality characteristic deviates" or "dynamically switching to another communication channel" based on a detected quality characteristic (e.g., feedback control). McMullan, on the other hand, simply describes pre-programmed clock switching of channels at selected times, e.g., 6:00 p.m. and 4:00 a.m., is not responsive to a detected "quality characteristic." In other words, McMullan's "power management" scheme is static and calibration occurs under

operator control, rather than being dynamically and automatically performed. Claim 24 further supports these distinctions by calling for switching based on "last operability indication," "signal to noise ratio" and "error frequency."

The invention defined by claim 17 and 19 operates in full-duplex mode using protocols with dynamic, real-time feedback mechanisms. No comparable operation is found in McMullan. We note that the McMullan system has little, if any, need to provide real-time interactive session-type network connectivity since it simply responds by fulfilling "orders" given by a remote terminal to download a file.

To summarize generally, with respect to the elements of the claims, McMullan does not anticipate the invention, as required under Sec. 102(b), because it lacks one or more of the features: (i) asymmetric communications, (ii) dynamic or automatic switching of channels based on power levels or quality characteristics, (iii) full-duplex interactive session-type network connectivity with remote user by simultaneous control of downstream and upstream communications and (iv) receiving acknowledgments at the transmit queue.

Rejection Under 35 U.S.C. §103

The examiner has rejected claims 1-6 and 15 under 35 U.S.C. Sec. 103 as being unpatentable over Litteral et al. ("Litteral") in view of Wheeler et al. ("Wheeler"). In summary, this rejection should also be withdrawn because the combined disclosures of Litteral and Wheeler with respect to recited elements of claims 1-6, 15 and new claims 26-74 do not teach or suggest (i) use of a "shared medium" between a distribution facility (headend or central office) adapted for point-to-multipoint communication between a host and multiple clients/users in conjunction with a network manager

or hybrid access system to manage or assign channels or bandwidth in order to provide efficient user of resources to support a greater number of users (this differs from the point-to-point architecture of ADSL networks where multiple users are reached by multiplexing (Litteral, Fig. 1),(ii) use of an "independent" asymmetric upstream channel that is "loosely" coupled with or controlled by the high speed downstream channel, such as by assignment of different protocols or packet data rates by a hybrid access system or a network manager (this is critical to attaining efficient use of the upstream channel), (iii) providing selectable control of speed on the lower speed return (upstream) channel to afford efficient use of bandwidth according to bandwidth demand and data type (e.g., text, audio, video) (this aspect particularly relates to claims 30, 32, 39, 42 and 44-47, where the upstream return channel is routed back to a headend facility for subsequent routing to the server), (iv) use of a hybrid access system or network manager to establish interactive session-type (real time, two-way) network communication between a host and a client/user (e.g., providing loose coupling between downstream and upstream channels to manage the flow of information in each direction based on user or server requests rather than just providing "ordering data" as described at col. 6 of Litteral), (v) use of a network manager or a hybrid access system for scheduling assignment of an upstream channel to a remote client/user in accordance with scheduling information including priority status, shared/dedicated channel request signal, service authorization or the like, (vi) use of different physical media (cable or wireless optical, electrical, electromagnetic, etc.) for upstream and downstream channels, or (vii) other features, aspects and advantages provided by the combination of these features.

As indicated above, the initial application claims have been amended to recite important distinctive features which succinctly point out and clearly define the invention over

the applied art. A major difference between the invention, as now claimed, and any combined teachings of Litteral and Wheeler lies in nature of the network interconnecting the host and the remote clients. The "shared medium" (e.g., LAN system) of the claimed invention provides point-to-multipoint distribution of information to remote clients whereas Litteral discloses an ADSL network, which has a point-to-point architecture.

As described below, the claimed differences provide other structural and operational differences which are reflected in the primary independent claims, as well as, in multiple dependent claims for which patentability stands alone.

Utilization of the claimed point-to-multipoint "shared medium" architecture, for example, is critical to attaining efficient utilization of system resources (e.g., substantial increases in the number of users for a given amount of hardware), attaining reliable information transfers by providing alternative routes (e.g., alternate switching of clients among different logical channels on the same shared (e.g., common) medium), improving tolerance to noise and other disturbances, providing multiple speeds of operation on the upstream channel when managed by a signal transmitted over the common medium, providing modular growth and scalability with minimum incremental equipment costs, affording flexible control of upstream traffic through various classes of service or client bandwidth demand, enabling the use of bandwidth of other idle client devices connect to the shared medium, and more. These aspects of the present invention cannot readily be attained using the point-to-point ADSL architecture of Litteral (Wheeler was cited only for its disclosure of routers).

Litteral describes a "video-on-demand" system enabling a user to "order" video programming by issuing requests over

"local loop" of a PSTN or dedicated ISDN network and receiving video information from a video provider over an ADSL network. (Col. 6, lines 3-14). Litteral's improvement relates to providing real-time control of video programming (col. 4, lines 30-34) and use of a video storage buffer 42 (Fig. 2) to provide VCR-type control of video (e.g., pause, slow motion, forward, reverse, etc. by the subscriber (col. 5, line 28-35, col. 11, lines 1-8). A "packet data network" is even suggested as a means for carrying order data (col. 6, lines 18, 35) and the subscriber local loop may include "a standard tip and ring telephone pair, a fiber optic cable or a coaxial cable" (col. 6, lines 29-30). The kind of video control includes scheduling data transmitted from the subscriber to the central office via telephone (col. 5, line 21). Wheeler, although cited for its disclosure of routers, discloses a share "platform" as opposed to a shared medium that distributes information via telephone lines (col. 5, lines 32-35). Connectivity between the central server and end users is established via the routers mentioned by the examiner. See col. 6, lines 23-35. Devices within the Wheeler system connect via a conventional LAN network.

As known in the art, systems like Litteral are not "interactive" in the real-time sense. A user simply "orders" a selection via a low speed channel, e.g., via telephone, and a video archive simply sends the information via a high speed channel. While this mechanism is asymmetric, the two-way communication is not conducted in a real-time session where a network manager or hybrid access system manages or coordinates upstream and downstream transmissions in terms of channel assignments, service level authorizations, switching between shared and dedicated channels, fulfillment of channel requests and the like. Litteral alludes to a "network session" at col. 7, line 61-62 (placed in quotes) but his system obviously is not conducted in a manner where interactive communication is

managed by a network manager or the like. In each direction of the Litteral's purported "session," respective communication paths, although asymmetric, are completely independent from each other lacking any intervention or supervision by a network manager, as claimed, to establish and maintain a user session with a server, as claimed, and do not occur over a shared medium. Even the upstream channel of Litteral's remote control unit 130 connection with the ADSL network (Fig. 2, col. 11, lines 1-8) fails to disclose any control by a network manager as discussed above. Important to distinguishing the claimed invention over the art is that Litteral transmits all upstream control data and all downstream video information on a dedicated loop between the subscriber and the central office. In other words, there is no "shared medium" in Litteral's path between the subscriber and central office.

It is stated at page 7 of the examiner's comments that Fig. 2 of Litteral shows a "network management system" that "anticipate[s] the system manager connected to the LAN." We believe that use of the term "anticipate" is inappropriate here since the analysis is to be conducted under Sec. 103, and not Sec. 102. Nevertheless, Litteral's purported network management system 28 fails to attain items (ii), (iii), (iv), (v) and (vi) mentioned above since, among other things, Litteral's ADSL network has a point-to-point architecture, e.g., has a spoke and hub configuration. Each use has a dedicated line to the central office. In fact, any suggestion that Wheeler's routers may be combined with Litteral point-to-point system seems a bit ambiguous since Litteral's connection is via dial-up on a dedicated line thereby obviating the need for a routing function. Use of dedicated line cannot motivate or suggest the use of routers. They are conflicting rather than supplementary thereby defeating the legal basis for *prima facie* obviousness. See §2143.01, MPEP.

Equally ambiguous is the reference to the Litteral's satellite dish of Fig. 1 as a teaching of "broadcasting" stated at page 7 of the examiner's comments. Is Litteral concerned with satellite broadcasting or was placement of satellite dish in drawing figure merely "window dressing?" No client devices in the Litteral system seem to be communicating over a shared satellite broadcast signal.

We also fail to see the relevance of the infrared remote control mentioned at page 7 of the examiner's comments to management of sessions, channel assignment and the like over a shared medium since the infrared remote control is also point-to-point and limited to one device at a time.

Further, Litteral's Network Manager 28 appears to be employed to control the digital cross-connect switch 24 for establishing the point-to-point connections by multiplexing. On the other hand, the point-to-multipoint architecture of the shared or common medium of the claimed invention enables broadcasts to, addressing of and management of multiple clients connect "in parallel" to a common medium whereby to achieve the critical advantages stated above.

In view of the above, we believe that it is readily apparent that Wheeler cannot be combined with Litteral to support an obviousness-type rejection under Sec. 35 U.S.C. 103. Considering what was to be achieved by the invention, as stated in items (i) through (vi) above, we hardly doubt that that combination alone, (e.g., ADSL technology and router technology) would have been of any benefit in leading a person of "ordinary" skill to achieve the recited structural and functional attributes of the invention, as defined by the present claims. In considering the invention as a whole (as required by Sec. 103), no grounds of obviousness can be supported on the basis of the applied art.

We also considered the other cited art and reached the same conclusion.

On the basis of the foregoing, reconsideration and early allowance is respectfully requested. Applicants' counsel stands ready to assist the examiner in resolving any issue regarding the claim language by telephonic or personal interview.

A request for an automatic one-month extension of time is hereby requested. Please charge any excess fees in connection with this response not otherwise provided upon submission to Cushman Darby & Cushman deposit account no. 03-3975 to the order of 7225/217537.

Respectfully submitted,

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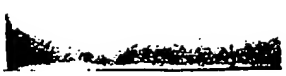

EXHIBIT D

CDC-3081 6/94

SUPPLEMENTAL DECLARATION — PATENT APPLICATION

SOLE/JOINT

As a below named inventor, I hereby declare: THAT I verily believe I am the original, first and sole (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the invention described and claimed in United States application No. 08/426,980, filed on April 21, 1995 and entitled:

Asymmetric Hybrid Access System and Method, as initially filed and as initialed in Fig. 7 and in claim 1, and

that the subject matter of claim(s) Nos. 1-6, 13, 17, 18-20, 24-25 and 26-74 x one) [x] per Amendment dated July 31, 1996

box only) [ ] as allowed

was part of my or our invention and was invented before the filing of the original application, above identified, and of its parent application(s) (if this is a continuing application thereof) for such invention; that I have reviewed and understand the contents of the specification, including (to the best of my ability) the claim(s), as above amended/allowed; that I acknowledged my duty to disclose all information known to me to be material to patentability of this application (including, if this is a CIP, in so far as the subject matter disclosed and claimed in this application is in addition to that disclosed in said parent application(s), my duty to disclose all information known to me to be material to patentability which became available between the filing date of said parent application(s) and the national or international filing date of this application) in accordance with 37 C.F.R. 1.56.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

(1) Inventor's Signature Eduardo J. Moura Date Aug 1, 1996

Inventor's Name(typed) Eduardo J. Moura
First Middle Initial Family Name

(2) Inventor's Signature Jan Maksymilian Grenski Date 8/1/96

Inventor's Name(typed) Jan Maksymilian Grenski
First Middle Initial Family Name

(3) Inventor's Signature _____ Date _____

Inventor's Name(typed) _____
First Middle Initial Family Name

(4) Inventor's Signature _____ Date _____

Inventor's Name(typed) _____
First Middle Initial Family Name

(5) Inventor's Signature _____ Date _____

Inventor's Name(typed) _____
First Middle Initial Family Name

NOTE: FOR ADDITIONAL INVENTORS, check box [ ] and attach sheet with signature and date for each.
Atty/Sec.

CDC 139 6/94

EXHIBIT D ALL STATE LEGAL SUPPLY CO.

CTC-285 9/94

SUPPLEMENTAL DECLARATION

PATENT APPLICATION

SOLE/JOINT

As a below named inventor, I hereby declare: THAT I verily believe I am the original, first and sole (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the invention described and claimed in United States Application No. 08/426,920, filed on April 21, 1995 and entitled:

Asymmetric Hybrid Access System and Method, as initially filed and as initialed in Fig. 7 and in claim 1, and

that the subject matter of claim(s) Nos. 1-6, 15, 17, 18-20, 24-25 and 26-74 (x one box only) [x] per Amendment dated July 31, 1996

[ ] as allowed

was part of my or our invention and was invented before the filing of the original application, above identified, and of its parent application(s) (if this is a continuing application thereof) for such invention; that I have reviewed and understand the contents of the specification, including (to the best of my ability) the claim(s), as above amended/allowed; that I acknowledged my duty to disclose all information known to me to be material to patentability of this application (including, if this is a CIP, in so far as the subject matter disclosed and claimed in this application is in addition to that disclosed in said parent application(s), my duty to disclose all information known to me to be material to patentability which became available between the filing date of said parent application(s) and the national or international filing date of this application) in accordance with 37 C.F.R. 1.56.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

(1) Inventor's Signature Eduardo J. Moura Date Aug 1, 1996

Inventor's Name(typed) Eduardo J. Moura
First Middle Initial Family Name

(2) Inventor's Signature Jan Maksymiliuk Gronski Date 8/1/96

Inventor's Name(typed) Jan Maksymiliuk Gronski
First Middle Initial Family Name

(3) Inventor's Signature _____ Date _____

Inventor's Name(typed) _____
First Middle Initial Family Name

(4) Inventor's Signature _____ Date _____

Inventor's Name(typed) _____
First Middle Initial Family Name

(5) Inventor's Signature _____ Date _____

Inventor's Name(typed) _____
First Middle Initial Family Name

NOTE: FOR ADDITIONAL INVENTORS, check box [ ] and attach sheet with signature and date for each.
Atty/Sec.

CDC 170 9/96

EXHIBIT E

a field in the credit control packet to the number of packets which was sent. If the protocol process at the server does not receive credit status information from the credit control packet within a certain credit time-out, CREDIT_TIMEOUT, in milliseconds, for a certain number of times, FAIL_CNT, consecutively, the remote link adapter is assumed to be in error and is put in a not-responding state (NON_RESP). The overall upstream channel performance of a remote link adapter using a credit channel is lower than a remote link adapter on a sole use upstream channel. If any sole use upstream channel becomes available, this channel is given to the credit remote link adapter that has been waiting the longest for a sole use upstream channel that currently has packets to send.

FIG. 18 is a flow diagram of information exchanges between Hybridware™ server and client, according to conditions in which the client has information to transmit and the server gradually allocates bandwidth to the client. In particular, a node first provides a single credit at a selected frequency F. Then a packet is sent, consuming the credit, followed by a completion message indicating use of one credit and potential for an additional transmission corresponding to three credits. Next, a credit is provided corresponding to two packets at the selected frequency F, which is followed by two packet transmissions and a completion message indicating consumption of two credits and potential for transmission of one more. In response, another double credit is sent, followed by a single packet and an acknowledgment of transmission of one and potential for no more transmissions.

FIG. 19 is a flow diagram of information exchanges between Hybridware™ server and client, according to conditions in which the server allocates the client a dedicated channel, the client transmits data and periodically reports to the server with done messages. In particular, a credit indication dedicating a channel at frequency F is provided, followed by 235 packet transmissions. According to prearrangement, an operability indication in the form of a DONE message is provided at an established time indicating potential for five more packet transmissions. The done message indicates completion of 235 packet transmissions, as an accounting function. Because the channel is dedicated, further packet transmissions are made without specific further credit allocations.

FIG. 20 is a flow diagram of information exchanges between Hybridware™ server and client, according to conditions in which a dedicated channel is converted into a shared channel. In particular, a credit indication code D indicating a dedicated channel at frequency F is provided, followed by transmission of 235 packets and a credit message stopping channel dedication and switching to a credit mode. Responsive to the credit message a DONE signal accounts for the 235 packets transmitted during the dedicated mode and indicates potential for five more transmissions. This is followed by a credit allocation of one at a selected frequency. Thus, one packet is transmitted, followed by a completion indication specifying potential for four more packets to be transmitted.

What is claimed is:

1. A hybrid access system for communication with at least a single data processor in a network, said system comprising:

a local area network which includes a shared medium;

a hybrid system manager in communication with said local area network for transmitting information over said shared medium and for interactively handling transfers of information thereover in accordance with a high speed downstream channel protocol and transfers of lower speed return information in accordance with an upstream channel protocol;

a downstream router in communication with said local area network for transmitting information over said shared medium;

an upstream router in communication with said local area network for receiving information,

a broadcast unit connected to said downstream router, said broadcast unit being capable of point-to-multipoint broadcast links on said local area network;

a downstream channel in communication with said broadcast unit for high speed transmission to said single data processor in communication with said shared medium;

an independent upstream channel in communication with said upstream router, for transmission of information from said data processor at a lower speed than transmission of information on said downstream channel;

at least a single remote link adapter associated with said data processor and being in communication with said upstream and downstream channels; and

at least a single client data processor in communication with said remote link adapter.

2. The hybrid access system according to claim 1, wherein said independent upstream channel includes a telephone network.

3. The hybrid access system according to claim 1, wherein said independent upstream channel includes a cable TV network.

4. The hybrid access system according to claim 1, wherein said independent upstream channel includes a wireless transmission path.

5. The hybrid access system according to claim 1, wherein said local area network includes a switch and said downstream router and said upstream router.

6. The hybrid access system according to claim 1, wherein said broadcast unit includes at least one of a group consisting of a cable TV headend, a wireless TV transmitter, a satellite transmitter and a cell site.

7. In a wide area network that includes a host server, a plurality of remote clients, a headend facility, a high speed interface that connects said headend facility with said host server, and a high speed link for transferring downstream data packets, a method of providing high speed remote access from any of a plurality of client processors each connected to said wide area network including high-speed downstream and lower-speed upstream channels controlled by a hybrid system manager and a router, said method including the steps of:

providing said downstream channel that is shared by said plurality of remote clients,

providing at least one independent upstream channel that enables at least one of said remote clients to transmit lower speed return data packets to said host server,

issuing an upstream channel authorization request by a lower speed channel for an upstream data channel currently used by a particular client data processor,

conducting login communications between the router and the system manager,

verifying authorized user status at the system manager.

authorizing specific upstream channel use by high speed downstream channel message, and

sending upstream data over an allocated lower speed upstream channel of the asymmetric network.

8. In a full-duplex asymmetric network communication system for transferring information between a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of the downstream channel, and wherein said network communication system includes a hybrid access system for providing interactive network sessions in downstream and upstream communication channels, a method of transmitting data from an upstream transmit queue in an upstream transmitter node to a selected receiver node located at a receiving end, said method comprising the steps of:

transmitting selected amounts of packet data from a first transmit queue in a first node to a second node wherein said second node includes a second transmit queue for transmitting acknowledgments to a receiver node,

generating acknowledgments of packet data received by said second node,

eliminating from the second transmit queue of the second node packet data acknowledgments which are redundant of other packet data acknowledgments in said second transmit queue, and

filling open transmit queue spaces with additional packet data.

9. In a full-duplex asymmetric network communication system for transferring information between a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of the downstream channel, and wherein said network communication system includes a hybrid access system for providing an interactive network session in downstream and upstream communication channels, a method of dynamically setting remote link adapter power levels in said hybrid access system, comprising the steps of:

transmitting successive indications to a hybrid upstream router at selected different power levels,

confirming receipt of a selected one of said indications, and

setting a level of future transmissions to a power level associated with the selected indication.

10. In a full-duplex asymmetric network communication system for transferring information from a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of the downstream channel, and wherein said network communication system includes a hybrid access system for providing an interactive network session in downstream and upstream communication channels, a method of packet suppression in communication between first and second nodes in said communication system having respective first and second transmit and receive queues, in which information packets having headers are transmitted from said first node to said second node, comprising the steps of:

loading a first information packet into the transmit queue of said first node;

loading a second information packet into the transmit queue of said first node;

checking the headers of said first and second information packets, and responsive to redundancy between the first and second headers, suppressing one of said first and second information packets.

11. In a full-duplex asymmetric network communication system for transferring information from a host server and a plurality of remote clients over a shared medium and wherein said remote clients include respective remote link adapters for receiving high speed downstream information from said host server over said shared medium and for transmitting lower speed return information over an upstream channel that is independent of the downstream channel, and wherein said network communication system includes a hybrid access system for simultaneously controlling the downstream and upstream in interactive network sessions, a method of dynamically responding to detected quality levels in a communication channel, comprising the steps of:

detecting a quality characteristic with respect to a selected communication channel from a selected group of quality characteristics each of which is defined by quantitative levels,

determining whether the quantitative level of the detected quality characteristic deviates with respect to a predefined norm, and

dynamically switching to another communication channel, if sufficient deviation is determined.

12. The method according to claim 11 wherein said group of quality characteristics includes time from last operability indication, signal to noise ratio, and error frequency.

13. A network communication system including a server, a plurality of remote clients and an information distribution facility for distributing information signals to said remote clients, said communication system comprising:

a downstream channel that is shared by said plurality of remote clients so as to enable said plurality of remote clients to receive high speed data packets from said server over a shared medium,

at least one independent upstream channel for enabling at least one of said remote clients to transmit lower speed return data packets to said server,

a hybrid access system including a network manager for interactively controlling both transfers of data packets from said server to said remote clients via broadcasts over said shared downstream channel in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over said independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said server and said plurality of remote clients, and

said hybrid access system further includes a server interface that enables communication with said server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared media and an upstream router for receiving return data packets from said remote clients.

14. The network communication system as recited in claim 13 wherein said plurality of remote clients include remote link adapters and said downstream router couples said shared medium to establish a physical connection with said downstream channel and said upstream router couples

said remote link adapters to establish a physical connection with said upstream channel.

15. The network communication system as recited in claim 13 wherein said independent upstream channel lies in a communication medium that is different from said downstream channel.

16. The network communication system as recited in claim 13 wherein said shared medium comprises a hybrid fiber coaxial cable and said remote clients physically connect in parallel to said hybrid fiber coaxial cable to receive simultaneously broadcasted data packets whereby to facilitate efficient sharing of resources at said distribution facility by said remote clients.

17. The network communication system as recited in claim 16 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

18. The network communication system as recited in claim 17 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

19. The network communication system as recited in claim 17 wherein said at least one independent upstream channel comprises an independent lower speed channel transmitted over said hybrid fiber coaxial cable, and said upstream router receives said data packets transmitted by said at least one remote client over said independent upstream channel and routes said data packets to said server.

20. The network communication system as recited in claim 13 wherein said distribution facility comprises a cellular broadcast facility, said shared medium comprises radio frequency broadcasts from said cellular broadcast facility, and said remote clients each comprise radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium so as to provide sharing of resources at said distribution facility by said remote clients.

21. The network communication system as recited in claim 20 wherein said at least one independent upstream channel comprises a lower speed cellular return channel routed through said distribution facility.

22. The network communication system as recited in claim 13 wherein said distribution facility comprises a satellite, said shared medium comprises a direct satellite broadcast and said remote clients includes a receiver for substantially simultaneously receiving information signals from said broadcast so as to provide sharing of broadcast resources among said remote clients.

23. The network communication system as recited in claim 22 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

24. The network communication system as recited in claim 13 wherein each of said upstream and downstream channels lies in a communication medium selected from one of a CATV distribution network, a cell site, a radio transmitter station, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

25. The network communication system as recited in claim 13 wherein said distribution facility comprises a television broadcast facility, said shared medium comprises radio frequency broadcasts from said television broadcast facility, and said remote clients include radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium whereby to provide sharing of resources located at said distribution facility.

26. The network communication system as recited in claim 25 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

27. The network communication system as recited in claim 26 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

28. The network communication system as recited in claim 13 wherein said distribution facility comprises a radio broadcast facility, said shared medium comprises radio frequency broadcasts from said radio broadcast facility, and said remote clients include radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium whereby to provide sharing of resources located at said distribution facility.

29. The network communication system as recited in claim 28 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

30. The network communication system as recited in claim 29 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

31. The network communication system as recited in claim 17 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

32. The network communication system as recited in claim 19 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

33. The network communication system as recited in claim 26 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel whereby to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

34. The network communication system as recited in claim 29 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

35. The network communication system as recited in claim 24 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel so as to provide more effective utilization of channel bandwidth according to demand by respective remote clients communicating with said shared medium.

36. The network communication system as recited in claim 13 wherein said distribution facility comprises a television broadcast facility, said shared medium comprises radio frequency broadcasts from said television broadcast facility, and said remote clients include radio frequency receivers for substantially simultaneously receiving data packets transmitted over said shared medium so as to provide sharing of resources located at said distribution facility.

37. The network communication system as recited in claim 36 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client to said information distribution facility which, in turn, routes said data packets to said server.

38. The network communication system as recited in claim 36 wherein said at least one independent upstream channel comprises a PSTN network that routes data packets transmitted by said at least one remote client directly to said server.

39. In a split-channel asymmetric network communication system including a host server, a plurality of remote clients and a headend facility for distributing information signals to said remote clients, a full-duplex packet delivery system comprising:

a downstream channel that is shared by said plurality of remote clients for receiving high speed data packets from said host server over a shared medium,

at least one independent upstream channel that enables at least one of said remote clients to transmit lower speed return data packets to said host server,

a hybrid access system including a network manager for controlling transfers of data packets from said host server to said remote clients via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and for controlling transfers of lower speed return data packets from said at least one remote client to said host server over said independent upstream channel in accordance with an upstream channel protocol and in accordance with scheduling information transmitted on the downstream channel, said network manager being further operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients,

said hybrid access system further including a backbone interface that enables connection with said host server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said at least one of said remote clients,

whereby said network communication system provides full-duplex interactive asymmetric communication in a session between said host server and said plurality of remote clients over said shared medium.

40. The invention as recited in claim 39 wherein said network manager schedules assignment of upstream channels for use by said at least one remote client in accordance with at least one of an upstream channel availability signal, a priority status signal, a shared/dedicated channel request signal, or a service level authorization signal.

41. The invention as recited in claim 39 wherein communication media for each of said downstream and said upstream channels is selected from at least one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

42. The invention as recited in claim 41 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel.

43. A network communication system including a host, a plurality of remote users and an information distribution facility for distributing information signals to said remote users, said system comprising:

a downstream channel shared by said remote users for receiving digital information signals transmitted from the host over a shared medium at a high speed,

at least one independent upstream channel for permitting the remote users to transmit digital information to said host at a lower speed than the high speed on the downstream channel,

a hybrid access system for interactively controlling transfers of digital information from said host to the remote users via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and for controlling transfers of digital information from said remote clients to said host at said lower speed over said at least one independent upstream channel in accordance with an upstream channel protocol, said hybrid access system being operable to provide full-duplex point-to-multipoint communication between said host and said remote users, and

said hybrid access system further including an interface for connecting with the host, a downstream router for enabling transmission of high speed information to said remote users over said shared medium and an upstream router for receiving return information from said remote users.

44. The network communication system as recited in claim 43 wherein communication media for each of said downstream and said upstream channels is selected from one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

45. The network communication system as recited in claim 44 wherein said upstream channel protocol enables operation of said upstream channel at multiple speed and said hybrid access system selectably controls speeds of data transfers on said upstream channel.

46. The network communication system including a host server, a plurality of remote clients and a headend facility for distributing data packets to said remote clients, said system comprising:

a downstream channel that is shared by said plurality of remote clients for receiving high speed data packets from said host server over a shared medium,

at least one independent upstream channel that permits said remote clients to transmit lower speed return data packets to said host server,

a hybrid access system including a network manager for controlling transfers of data packets from said host server to said remote clients via broadcasts over said shared medium in accordance with a high speed downstream channel protocol, and for controlling transfers of lower speed return data packets from said remote clients to said host server over an independent upstream channel located on a physical medium that is different from shared medium of said downstream channel, said upstream communication channel being assigned in accordance with an upstream channel protocol and scheduling information transmitted on the downstream channel, said network manager being further operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients,

said hybrid access system further including a backbone interface that enables connection with said host server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

47. The network communication system as recited in claim 46 wherein said hybrid access system effects control of assignment of upstream channels to said remote clients in accordance with scheduling information including a dedicated or shared channel request signal, a channel availability signal, a priority status signal or class of service signal.

48. The network communication system as recited in claim 47 wherein communication media for each of said downstream and said upstream channels is selected from one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

49. The network communication system as recited in claim 48 wherein said upstream channel protocol enables operation of said upstream channel at multiple speeds and said hybrid access system selectably controls speed of data transfers on said upstream channel.

50. A client-server system including a split-channel asymmetric network for enabling multiple users to share information, said system comprising:

a host server,

a plurality of remote users,

a distribution facility for distributing information signals to said remote users,

a downstream channel that is shared by said plurality of remote users so as to enable said plurality of users to receive high speed data packets from said host server over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote users to transmit return data packets to said host server at a lower speed than a data packet rate transmitted in said downstream channel,

a hybrid access system for interactively controlling both transfers of data packets from said host server to said remote users via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote users to said host server over an independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote users in an interactive session wherein transmission of upstream information is controlled, in part, by control information transmitted over said downstream channel, and

said hybrid access system further including a host interface that enables communication with said host server, a downstream router for enabling transmission of high speed data packets to said remote users over said shared medium and an upstream router for receiving return data packets from said remote users.

51. In combination with a multi-user computer system including at least one host computer and a plurality of remote clients, the improvement comprising:

a packet distribution facility connected with said host computer for distributing data packets from said host computer to said remote clients,

a downstream channel that is shared by said plurality of remote clients so as to enable said plurality of remote clients to receive high speed data packets from said host server over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote clients to transmit return data packets to said host server at a speed that is lower than a data packet rate transmitted in said downstream channel,

a hybrid access system including a network manager for interactively controlling both transfers of data packets from said host server to said remote clients via broadcasts over said shared medium that communicates with said plurality of remote clients in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over said independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients, and

said hybrid access system further including a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

52. In combination with a CATV broadcast transmission facility including a shared medium downstream channel that is shared by a plurality of remote clients to receive high speed data packets from a host server, the improvement comprising:

respective RLA devices associated with said remote clients that are connected with said shared medium and tuned so as to receive high speed transfers of data packets for conveyance to said remote clients,

at least one independent upstream channel that enables said remote clients to transmit lower speed return data packets to said host server,

a hybrid access system including a network manager for interactively controlling both transfers of information data packets from said host server to said remote clients via broadcasts over said shared medium that communicates with said plurality of remote clients in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over said independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multi-

point communication between said host server and said plurality of remote clients in an interactive session wherein transmission of upstream information is monitored or controlled, in part, by control information transmitted through said downstream channel, and

said hybrid access system further including an interface that enables connection with said host server, a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients,

whereby said improvement acts to provide full-duplex interactive asymmetric communication in a session between said host server and said plurality of remote clients through said CATV broadcast transmission facility over said shared medium.

53. The network communication system as recited in claim 52 wherein communication media for each of said downstream and said upstream channels is selected from one of a CATV distribution network, a cell site, a television transmitter station, a hybrid fiber coaxial cable network, an over-the-air wireless network, a direct broadcast satellite communication network and a telephone network.

54. The network communication system as recited in claim 53 wherein said upstream channel protocol enables operation of said upstream channel at multiple speed and said hybrid access system selectably controls speeds of data transfers on said upstream channel.

55. In combination with a television signal broadcast facility, the improvement comprising:

a host computer,

a plurality of remote clients,

a packet distribution facility connected with said host computer for distributing data packets from said host computer to said remote clients,

a downstream channel that is shared by said plurality of remote clients so as to permit said plurality of remote clients to receive high speed data packets from the host server over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote clients to transmit return data packets to said host server at a lower speed than a data packet rate transmitted in said downstream channel,

a hybrid access system including a network manager for controlling transfers of data packets from said host server to said remote clients via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and for receiving transfers of lower speed return data packets from said remote clients to said host server over an independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients, and

said hybrid access system further including a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

56. In combination with a television signal broadcast facility, a network of host computers and a plurality of remote clients, the improvement comprising:

a packet distribution facility connected with said host computer for distributing data packets from said host computer to said remote clients,

a downstream channel that is shared by said plurality of remote clients so as to enable said plurality of remote clients to receive high speed data packets from the host server over a shared medium,

at least one upstream channel that is independent of said downstream channel for enabling said remote clients to transmit return data packets to said host server at a lower speed than a data packet rate transmitted in said downstream channel,

a hybrid access system including a network manager for controlling both transfers of data packets from said host server to said remote clients via broadcasts over said shared medium in accordance with a high speed downstream channel protocol and transfers of lower speed return data packets from said remote clients to said host server over an independent upstream channel in accordance with an upstream channel protocol, said network manager being operable to provide full-duplex point-to-multipoint communication between said host server and said plurality of remote clients, and

said hybrid access system further including a downstream router for enabling transmission of high speed data packets to said remote clients over said shared medium and an upstream router for receiving return data packets from said remote clients.

57. In an asymmetric network communication system including a host server and a plurality of remote clients wherein respective remote clients have associated remote link adapters that operate in accordance with predefined downstream and upstream protocols, said system including:

a headend facility that distributes information signals,

a downstream channel that is shared by said plurality of remote clients so as to permit said plurality of remote clients to receive high speed information signals from said host server over a shared medium,

at least one upstream channel that is independent of said downstream channel to enable at least one of said remote clients to transmit return information signals to said host server at a lower speed than said information signals transmitted over said downstream channel,

a hybrid access system for controlling transfers of information signals transmitted from said host server to said remote clients over said shared medium in accordance with said downstream protocol and for monitoring communication over said independent upstream channels thereby to provide interactive communication between said host server and at least one of said plurality of remote clients over said downstream and upstream communication channels, and

said hybrid access system further including a backbone interface that enables connection with said host server, a downstream router for enabling transmission of high speed information to said remote clients over said shared media,

whereby said asymmetric network communication system provides full-duplex interactive asymmetric communication between said host server and said at least one of said plurality of remote clients in a shared medium environment.

58. A packet delivery system for use in an asymmetric network to provide full-duplex communication, said system including a host server and at least one remote client that has a remote link adapter operating in accordance with a high speed downstream and a lower speed upstream protocol, said packet delivery system comprising:

a downstream channel that is shared by said at least one remote client so as to enable said at least one remote

client to receive high speed data packets from said host server over a shared medium,

at least one independent upstream channel that enables said remote client to transmit lower speed return data packets to said host server,

a hybrid access system for controlling transfers of data packets from said host server to said remote client over said shared medium in accordance with said downstream channel protocol and for monitoring communication over said independent upstream channel thereby to schedule upstream communication in accordance with predefined rules, and

said hybrid access system further including an interface that enables connection with said host server and a downstream router for enabling transmission of high speed data packets to said remote client over said shared media.

59. A packet delivery system as recited in claim 58 wherein said hybrid access system effects control of assignment of upstream channels to said remote client so as to assign either a shared channel or dedicated channel to a remote client.

60. A packet delivery system as recited in claim 59 wherein said hybrid access system effects switching of channel assignments among said remote client between shared and dedicated upstream channels.

61. The method as recited in claim 7 further including the step of providing said independent upstream channel on a medium different from a physical medium of said downstream channel.

* * * * *

EXHIBIT F

KEEP ON TOP UNTIL APPLICATION IS FILED

REQUEST FOR CASE DOCKET SUB-MATTER NUMBER

Date: 9/6/94

Date Disclosure Received From Client: 7/14/94

Client Name: Hybrid Networks, Inc.

Client No.: 18323 Alpha: HYBR

Responsible Attny.: ACS Working Attny.: ACS

Full Inventor(s) Name: Ed Mauro

Title of Disclosure: Hybrid Access System

if not disclosure then the case is a:

CIP_____ DIV_____ FWC_____

Of Case_____

If File Is Transferred To Fenwick & West,

Filing Date:_____ Serial No.:_____ Pat. No.:_____

Title:_____

NEW CASE AND SUB MATTER NO: 1572, 18323-01572

Karyl, *please prepare a new case memo for the above matter.*

Deadline to File Application: Per ACS - no deadline

(will be docketed 3 months from Request Date unless otherwise stated)

Reminder: Give JRV file when application is filed!

(06/16/94) PATTSY__ CLIENT LOG__ M.L.__ BILL__

EXHIBIT F ALLSTATE LEGAL SUPPLY CO.

EXHIBIT G

Hybrid Networ ;, Inc.

Facsimile Transmittal Sheet*

TO: Bob Sabath FAX # 415 494-1417

COMPANY: Fenwick & West

CC: _____ FAX # _____

_____ FAX # _____

FROM: Ed Mova FAX # (408) 725-2439

DATE: 12/9/94

NUMBER OF PAGES (INCLUDING THIS COVER SHEET): 18

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Hybrid Access System and Related Inventions
Patent Application

Background of the Inventions

These inventions relate to a system used to extend a high-speed backbone network such as the Internet or centrallized local multimedia content to any remote location using a "hybrid" asymmetric architecture. The Hybrid Access System (HAS) splits the full-duplex communications path between the central site and remote site into two separate communications links. In certain configurations, the upstream link can use a separate medium from the downstream link and each link can operate independently of one another, at different speeds and with independent protocols. In other configurations, both the upstream and downstream links can share the same physical medium while operating at different speeds and with independent protocols.

At the present time, most data communication networks use symmetric communications paths between the transmit and receive sites and vice versa. Other networks use a broadcast only path, but today no network is capable of combining the flexibility of full-duplex symmetric point-to-point networks with the cost effectiveness of broadcast only networks. The HAS and its related inventions can extend the high-speed backbone network and the local multimedia content to remote sites at high-speeds and affordable costs while maintaining the full interactive duplex characteristics of symmetric networks. The HAS will initially use contiguous bandwidth in standard 6Mhz TV channels in the downstream direction, but it could also use other high-bandwidth broadband services in the downstream direction which could include HDTV or any other low-cost, high-speed broadband modem. The HAS will initially use standard telephone lines and cable TV narrow band sub-split sub-channels in the upstream direction, but it can also use other return channels including ISDN, radio or any other low-cost, low-to-medium speed modems. The HAS is unique because it can mix and match many different combinations of downstream and upstream channels. No other system is capable of providing the same level of flexibility.

There have been previous attempts to provide asymmetric data communications systems. Some of this work included modems with very low speed return channels and systems that combined a low speed radio broadcast channel with telephone return lines. However, none of these systems was capable of extending multimedia content and on-line

information services to remote locations at high-speeds. All other documented asymmetric work done in the past used low speed links. The HAS invention is unique when compared to previous art. It is the only high-speed asymmetric network system of its kind that is capable of combining any given high-speed dowstream channel with any other completely separate upstream channel to form a two-way, high-speed data communications system.

Specific components of the HAS include the information sources (On-line Information Providers, Corporations, Government Agencies, Universities, Libraries and others), the backbone networks, the Hybrid Transmission Facility (HTF), Point of Presence (PoP) sites and the HAS link which includes the following sub-components: the high-speed links to connect the PoP site to the CATV head-end, TV transmitter site or cell-site, the CATV head-end site, the TV transmitter site or cell-site, the downstream channel, the remote user site and finally, the independent upstream channels.

Summary of the Inventions

The various HAS inventions described and claimed here are related to different aspects of the HAS operation. Some of the HAS related inventions deal with specific protocols and protocol enhancements done to the downstream and upstream transmission links when operating in an environment like the HAS. Other HAS related inventions deal with specific functions and enhancements implemented within the Hybrid Router products and with the system itself.

The Hybrid Access System (HAS)

The HAS is a unique system that combines two or more independent simplex channels to create a full-duplex data transmission system. The various independent transmission channels are controlled from the HTF or PoP. Throughout this document, HTF and/or PoP will be used interchangeably and will mean the same thing. At the remote site, Remote Link Adapters (RLAs), patent # 5,347,304 are used to recombine the independent transmission channels. The RLAs use the Hybrid Protocols to talk to the HTF. RLAs can only talk to each other via the PoP. A PoP interconnects multiple cable TV head ends and TV transmitters or cell sites via high speed lines (see Fig. 1). The independent upstream transmission channels connect back to the PoP either through a separate medium or through the same medium. The following are illustrative examples of different HAS configurations. This does not exclude other HAS configurations:

1. A HAS configuration which uses downstream cable TV channels and upstream PSTN or ISDN telephone lines;

2. A HAS configuration which uses downstream wireless TV channels and upstream PSTN or ISDN telephone lines;

3. A HAS configuration which uses both downstream and upstream cable TV channels.

The HTF/PoP contains Hybrid Routers and the Hybrid Network Management Station (HNMS). These are the main central site (i.e., server) building blocks of the HAS. Hybridware™ server software runs on Hybrid Routers. This server software implements Hybrid Protocols, the specific asymmetric system enhancements (i.e, HAS related inventions) and the rest of the control and data transmission system. The remote site HAS building block is the RLA. Hybridware™ client software runs on the RLAs. This client software also implements Hybrid Protocols, the specific asymmetric system enhancements (i.e, HAS related inventions) and the rest of the control and data transmision system. The HAS can be characterized as a unique client-server network system.

Ack Suppression

The first of the specific HAS related inventions being described here is the invention of "ack suppression". Consider two systems A and B connected by two independent, simplex communications links like the HAS. Let us assume that the transfer rate from A to B is m bps and that the transfer rate in the opposite direction is n bps where $n > m$. Further assume that the two systems communicate using a protocol which requires that the system receiving data has to acknowledge the receipt of either data packets or data bytes contained in incoming packets (see Fig 4a and 4b). Let us also assume that the protocol uses the following acknowledgement scheme. The acknowledgement of byte number k indicates that all bytes prior to k have been received (similarly acknowledgement of packet number k acknowledges receipt of all previous packets). The numbers on the data packets indicate the position of the last data byte of the packet in the data stream and the acknowledgement numbers indicate that all the bytes of the data stream up to and including the byte indicated by the ack have been correctly received.

If system B generates and system A receives the data and the rate of incoming data is sufficiently large and the size of acknowledgements is sufficiently large, then the link from A to B will not be able to send all the acknowledgements out in time and the transmit queue in A will grow. Implementing the ack suppression method consists of discarding redundant acknowledgements from the lower speed transmit queue.

Packet Suppression

The second of the specific HAS related inventions being described here is the invention of "packet suppression". Consider two systems A and B connected by two independent, simplex communications links like the HAS. Let us assume that the transfer rate from A to B is m bps and that the transfer rate in the opposite direction is n bps where $n > m$. Let us also assume that the protocol uses the following acknowledgement scheme. The acknowledgement of byte number k indicates that all bytes prior to k have been received (similarly, acknowledgement of packet number k acknowledges receipt of all previous packets). Let us now assume that the protocol transmits a certain amount of data (packets) called the transmit-ahead-window or window, and then awaits packet acknowledgements. As a packet acknowledgement arrives, the transmit-ahead-window opens up to the extent that was acknowledged by the receiving system. If system A generates large packets, and if the transmission rate from A to B is sufficiently low, then the time-out value might be insufficient and retransmission might occur even though the original packet has never left system A (see Fig.6). Implementing the packet suppression scheme consists of searching the transmit queue and throwing out packets that carry information which is identical to that in a packet which is already present in a previously enqueued packet (see Fig.6).

Hybrid Protocols

The third of the specific HAS related inventions being described here is the invention of the Hybrid Protocols. These protocols can be organized in the following categories:

1. Automatic address allocation and configuration protocol. This protocol uses a unique discovery scheme to identify remote users. Prior art includes RARP, bootp and Netbios. This Hybrid protocol differs from the prior art in many significant ways. First, the remote HAS user is given an abstract name; say "Bob". Second, the name is registered by the operator on the HNMS database. Then, all the Hybrid

Downstream Routers (HDRs) start broadcasting for that name such that a response from the appropriate user/RLA can uniquely determine where the name resides. Once the node associated with the name is determined (based on the response message from the RLA), an address (e.g., IP address) is allocated and delivered to the remote user. This protocol uses broadcast. In contrast, other Hybrid Protocols use direct polls (e.g., upstream channel allocation).

2. Prioritized Polling Protocol. This protocol allows the Hybrid Routers to communicate with the RLAs via a prioritized polling scheme. There are other types of polling protocols in prior art. However, the Hybrid Protocol differs from prior art in many significant ways. Various RLAs can be at different status like configuring, idle (when responding to polls), not responding (i.e., off-line, bad reception or dead), requesting a channel, active (have been assigned a dedicated upstream channel for data transmission) or credit active (are sharing an upstream data channel). The Hybrid Upstream Routers (HUR), which implement this protocol, prioritize the polling based on the prior knowledge of the status of the RLAs (i.e., results from the previous polls). For example, RLAs that are idle are polled more frequently than RLAs that do not respond. In addition, if several RLAs are in the same state (e.g., requesting channels, active or credit active), the HUR will assure fairness by assigning upstream channels to RLAs that waited the longest or to RLAs that have the highest class of service. Credit active RLAs are also given fair treatment. Finally, RLAs with dedicated active channels will also be monitored but not polled. Used channels may revert back to unused if data transmission stops for a certain time interval. These channels will then be allocated to another RLA that is requesting a channel.

3. Automatic Gain Adjustment Protocol. This protocol allows the RLAs to adjust the transmit power level based on feedback from a poll from the HUR. The RLA starts transmitting at the lowest level until the HUR tells it that it heard from the RLA. The RLA's transmit level is then set to a level that corresponds to the best estimated level for that particular transmitter.

4. Upstream Channel Allocation Protocol. This protocol is responsible for the allocation of upstream channels to RLAs. In one of its configurations, the HAS can use multiple narrowband, point-to-point, cable TV upstream channels. The upstream modulator on the RLAs is frequency agile and can be instructed to tune to

a wide range of those narrowband upstream channels. If the HUR determines that it has available upstream channels, then the best quality channels are first assigned to the RLAs on a first come first serve basis. In other words, upstream channel assignment is based on the most recent demand. Provision for priority assignments, based on quality of service are also possible. If all the channels are busy, then the HUR waits until upstream channels become available to assign them to RLAs that are queued up with requests for upstream channels. There are two timeout mechanisms for RLAs to release an upstream channel. The first timeout is as follows: If an RLA stops transmitting for 2 to 10 seconds, then that RLA might be bumped to a credit channel (see below), by releasing the dedicated channel for a more active RLA. With the second timeout, if the RLA stops transmitting for a number of minutes, then it will lose its upstream channel and it will be placed in an idle, non-active mode. Once channels are allocated to RLAs, then the RLAs are not polled anymore. However, the active RLAs are responsible for sending a heartbeat message to the HUR telling it that they are alive and well. If everything is fine (i.e., the server protocol process is hearing the RLA heart beats), then that particular channel is assumed to be of good quality. If not, then the channel is assumed to be bad. Bad channels are automatically disabled if they are determined to be bad several times in a row when trying to assign them to more than one RLA. The channel allocation algorithm reassigns the best channels which are properly released. Those channels are allocated first. The worst channels are allocated last. Channel quality measurements are based on recent usage and recent failures. Good channels that have not been used for a while are assumed not to be as good as good channels that have just been released. Idle RLAs are used to determine the sanity of bad channels. Some of the prior bad channels are automatically re-enabled if they are determined to be good again when tested with idle RLAs.

5. Credit Allocation Protocol. The credit protocol allows single upstream cable channels to be shared by multiple RLAs. This is contrasted to a "normal" "sole user upstream channel" in which is owned and used by by a single RLA until that RLA relinquishes the channel. Any HAS cable upstream channel may may be designated to be a shared or "credit" channel. A credit channel is shared between as many as RLAs designated by a particular configuration parameter. Each RLA in the credit group is passed a credit control packet at which time it may use the credit to send data packets to arbitrary hosts. When tan RLA has a credit, it may send a certain number of packets up to a maxium number controlled by a configuration parameter

(MAX_CREDIT_PACKETS) data packets may. After sending any data packets, the RLA returns the credit control packet to the Hybridware™ server software . If the RLA does not have a data packet to send, it simply returns the credit to HAS without sending any data packets. The RLA sets a field in the credit control packet to the number of packets that was sent. If the protocol process at the server does not receive the credit status from the credit control packet within a certain timeout (CREDIT_TIMEOUT) in milliseconds, for a certain number of times (FAIL_CNT) consecutively, the RLA is assumed to be in error and is put in the "not responding" state. The overall upstream channel performance of a RLA using a credit channel is lower than a RLA on a sole use upstream channel. If any sole use upstream channel becomes available, this channel will be given to that credit RLA that has been waiting the longest for a sole use upstream channel that currently has packets to send. If such a credit RLA is found, that RLA returning the sole use channel will be assigned to the credit group.

Brief Description of the Drawings

Figure 1 shows the the overall components of a HAS network. HTFs/PoPs are interconnected via a backbone network. This backbone network can either be a public (e.g., Internet) or a private network. Information Providers connect to the PoP via dedicated lines or via the backbone network itself. Next, each PoP interconnects multiple cable TV head ends, TV transmitters and/or cell (node) sites via high speed links. Finally, RLAs connect to the high speed RF downstream channels and to the independent upstream channels. Figure 2 shows the major building blocks of the HTF/PoP. Hybrid Downstream Routers (HDRs) drive the downstream high speed RF channels and Hybrid Upstream Routers (HURs) receive the independent upstream channels. Figure 3 shows the overall characteristics of the HAS asymmetric link. Figure 4 shows an example of the ack suppression mechanism and the general configuration for both ack and packet suppression. Figure 5 shows the TCP/IP headers and Figure 6 shows an example of the packet suppression mechanism.

Detailed Description of the Illustrative Embodiments

Each of the HAS related inventions described and claimed here include a significant detailed description of their implementation. The detailed description for the ack suppression invention and the detailed description for the packet suppression invention are detailed below.

<I still need to include the detailed descriptions, for the HAS itself and the Hybrid Protocols. >

Ack Suppression

Consider the transmit queue of packets from A to be resident in system A as depicted in Fig. 4(c). Let us assume that "pkt 1" is currently being sent and that "ack 250" message is currently being appended to the end of the transmit queue. Without the ack suppression scheme all 4 packets will be sent to B even though "ack 250" message carries information which supersedes "ack 100" message. The Ack Suppression system will scan the transmit queue, observe that the "ack 100" message is superfluous and delete it, thus reducing the amount of traffic on the communication link from A to B.

In a general case this may introduce additional acknowledgement latency, but in the case where all messages queued up for transmission are acknowledgements, acknowledgement latency is actually reduced. Consider the following case:

"Ack 15" message is being transmitted and "ack 100" message is awaiting transmission. Let us assume that "ack 210" message is appended to the queue. Ack Suppression system will delete "ack 100" message as superfluous. Any new acknowledgements appended while "ack 15" is being transmitted will result in deletions of unnecessary acknowledgements keeping queue length to 2. Upon transmit completion of "ack 15" the system will start transmitting the next acknowledgement (in our case "ack 210" -- see Fig. 4d). This approach eliminated unnecessary transmission of "ack 100" and reduced acknowledgement latency for "ack 210". Ack suppression method reduces the probability of the queue overflow and potential out-of-memory condition in system A, reduces load on the communication link from A to B and in some circumstances reduces acknowledgement latency for data transfers from B to A. This method is applicable when A and B are end-systems, as depicted above, as well as in the situation when A is an intermediate system (e.g. a router) and the data packets are generated by a system C. In this situation C sends packets to A and A forwards them to B. The Ack Suppression method can run on C, A or both (see Fig. 4e).

The Ack Suppression method, although applicable to other protocols, has been developed in the context of the TCP/IP protocol. In order to understand the method it is necessary to

review the TCP/IP header (see Fig. 5). The first five 32 bit words and the following ip options will be referred to as *ip header*. The five words following ip options together with the words containing tcp options are referred to as *tcp header*. We shall refer to the *non-ack tcp header* as the *tcp header* minus the acknowledgement number field.

See RFC xxx and RFC yyy for the full description of the header field usage and the protocol.

The following program is an illustrative example of a specifc implementation of the ack suppression invention for TCP/IP. This is just an example as there are other potential ways to implement this invention. Consider IP acknowledgement "m1" in the transmit queue. Let "m2" be a new acknowledgement about to be enqueued for transmission. The logic of suppressing acknowledgements can be expressed as follows:

```
If (ip header(m1) = ip header(m2)) then
        if (source port (m1) = source port(m2)) then
                if (destination port(m1) = destination port (m2)) then
                        if (sequence number(m1) = sequence number(m2)) then
                                If (acknowledgement number (m1) >
acknowledgement number(m2)) then
                                        discard(m2)
                                endif
                        endif
                endif
        endif
else
        enqueue(m2)
endif
```

Please refer to Fig. 5 for the names of appropriate TCP/IP header fields. In addition, the following amendment shows the correct ack suppression logic which should be expressed as follows:

```
If (ip header(m1) = ip header(m2)) then
        if non-ack tcp header (m1) = non-ack tcp header(m2) then
                If (acknowledgement number (m1) > acknowledgement
number(m2)) then
                        discard(m2)
                endif
        endif
else
        enqueue(m2)
endif
```

Packet Suppression

Let us assume that in Figure 6 the numbers on the data packets indicate the position of the last data byte of the packet in the data stream and that the acknowledgement numbers indicate that all bytes of the data stream up to and including the byte indicated by the ack

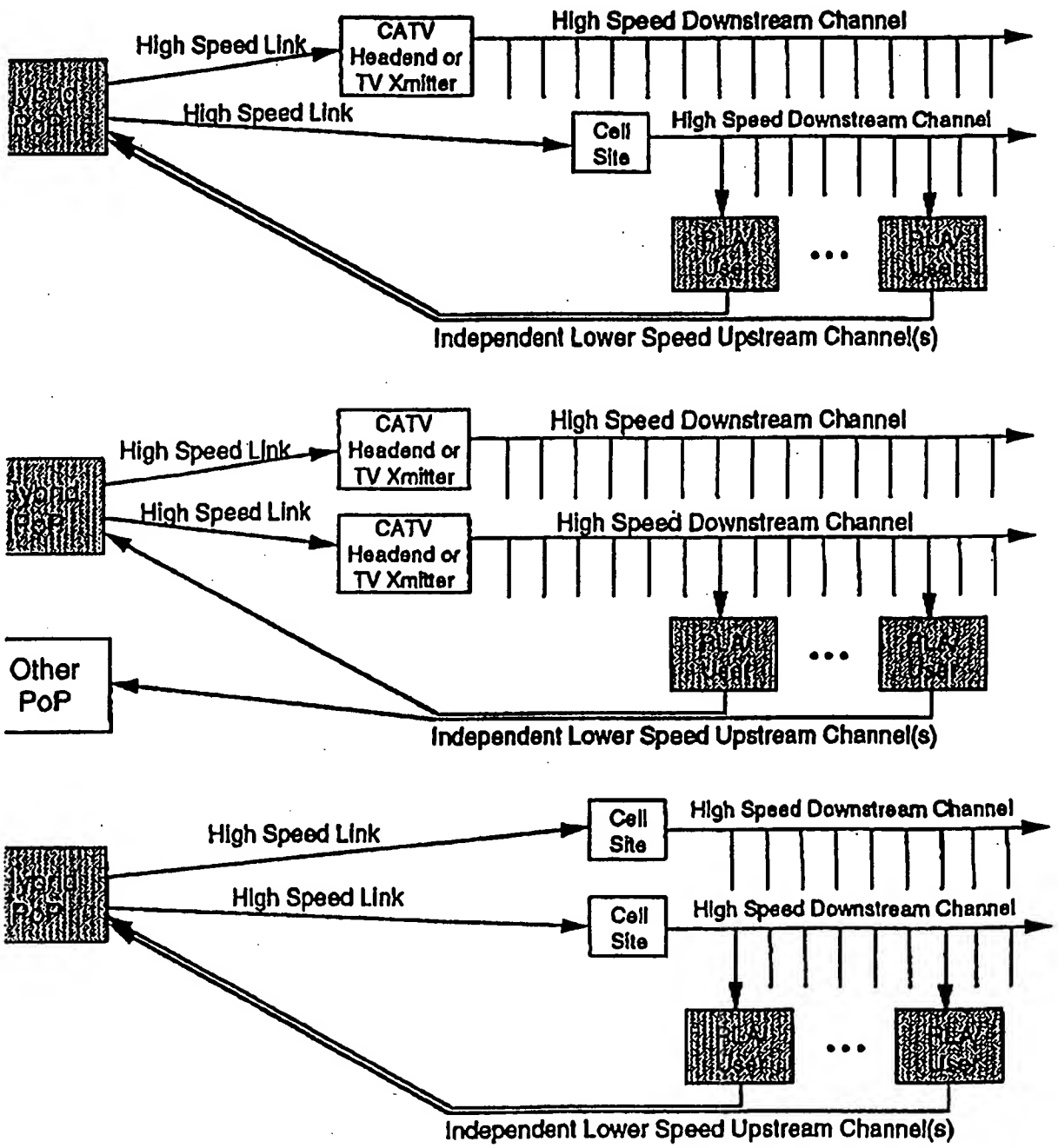
have been correctly received. The numbers on the right indicate the amount of data A is allowed to transmit at any given time. System A awaits for an acknowledgement of a packet for a certain amount of time Δt from the time that the packet was transmitted. Then, if the acknowledgement is not received within Δt, the original packet is retransmitted (see Fig. 6b). At this stage, the Packet Suppression scheme searches the transmit queue and disallows (to enqueue) a packet that carries information which is identical to that in a packet already present in a previously enqueued packet (see Fig.6a). This method is applicable when A and B are end-systems, as depicted above, as well as in the situation when A is an intermediate system (e.g. a router) and the data packets are generated by a system C. In this situation C sends packets to A and A forwards them to B. The Packet Suppression method can run on C, A or both (see Fig. 5).

The Packet Suppression method, although applicable to other protocols, has been developed in the context of the TCP/IP protocol. In order to understand the method it is necessary to introduce the TCP/IP header (see Fig. 5). The first five 32 bit words and the following ip options will be referred to as *ip header*. The five words following ip options together with the words containing tcp options are referred to as *tcp header*. We shall refer to the *non-ack tcp header* as the *tcp header* minus the acknowledgement number field.

See RFC xxx and RFC yyy for the full description of the header field usage and the protocol. The following program is an illustrative example of a specifc implementation of the packet suppression invention for TCP/IP. This is just an example as there are other potential ways to implement this invention. Consider IP packet "m1" in the transmit queue. Let "m2" be a new packet about to be enqueued for transmission. The logic of suppressing retransmitted packets can be expressed as follows:

```
If (ip header(m1) = ip header(m2)) then
        if (tcp header (m1) = tcp header(m2)) then
                discard(m2)
                                endif
else
        enqueue(m2)
endif
```

Please refer to Fig. 5 for the names of appropriate TCP/IP header fields.



ess System (HAS) Network -- Figure 1

EXHIBIT H

Hybrid Networks, Inc.

Facsimile Transmittal Sheet*

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COMPANY: Fenwick & West

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_____ FAX # _____

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DATE: 1/23/95

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EXHIBIT 4 ALL-STATE LEGAL SUPPLY CO.

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JAN 23 '95 14:12 408 725 2439 PAGE.01

1. Introduction

Hybrid Access System HAS) enables communication over a CATV network. The main elements of HAS are: System Manager, Hybrid Router, a Hybrid Client and an application. The application may reside on the same system as the Hybrid Client or it maybe connected to a Hybrid Client via some media (e.g. bus, ethernet, RS232 connection), see Fig. 1. The System Manager may reside on the same system as the Hybrid Router or maybe connected via some media.

When the application requires services of the Hybrid Upstream Protocol to establish connection to a another system, on or outside of HAS. The connection is established via a Hybrid Upstream Protocol (HUP) implementation residing on a Hybrid Router. HUP, a member of the Hybrid protocol family, allows the Hybrid Router to manage upstream bandwidth for data transmissions by the applications and Hybrid clients (see fig. 10). The downstream bandwidth may also be managed on a Hybrid Router using other protocols.

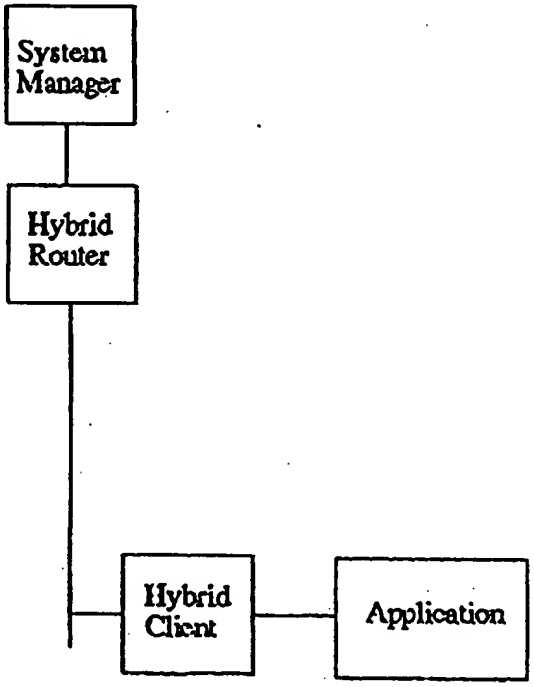


Figure 1

2. Connection flow in a 2-way cable network

An application issues a connection request by sending data it wishes to transmit to the Hybrid Client. Hybrid Client buffers the data and checks if it owns an upstream data channel. If it does the data is transmitted forthwith. If Hybrid Client does not own a data channel it then queues up the data message, creates a Channel Request message and awaits a poll from the Hybrid Router. Upon receipt of the poll, the Hybrid Client transmits the Channel Request message and waits for a response from the Hybrid Router.

Hybrid Router will send a Login message to the System Manager. Based on information contained in its data base the System Manager will send a Login response message which will indicate whether the client is allowed to operate on this network and will contain other operating characteristics of the Hybrid Client.

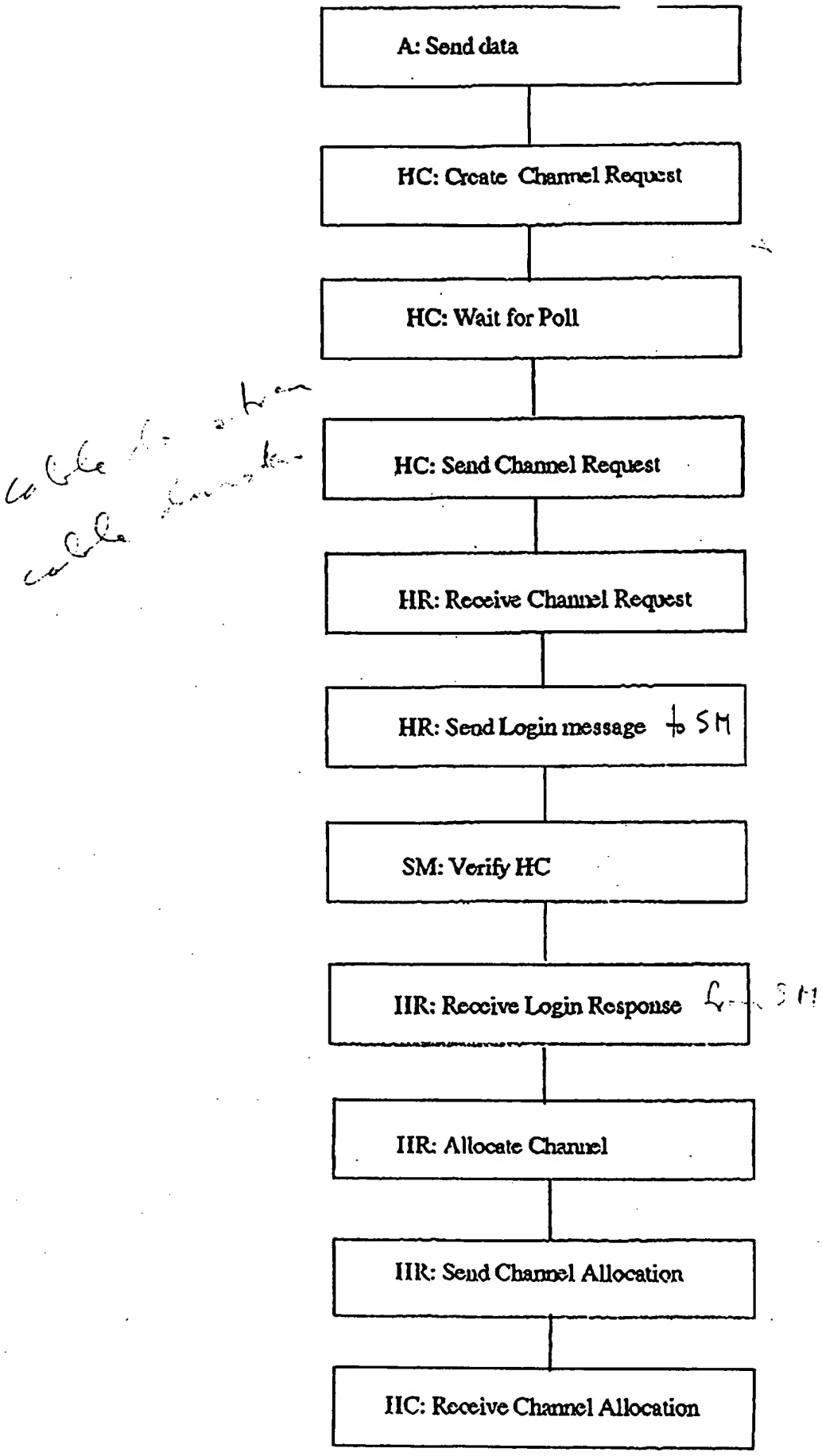
Hybrid Router checks the channel availability and selects the most suitable upstream channel. The suitability maybe influenced by such factors as: channel quality, type of service required, operating characteristics of the Hybrid Client, configuration restrictions or others. Hybrid Router then creates a Channel Allocation message which specifies the frequency on which the Hybrid Client is allowed to transmit data.

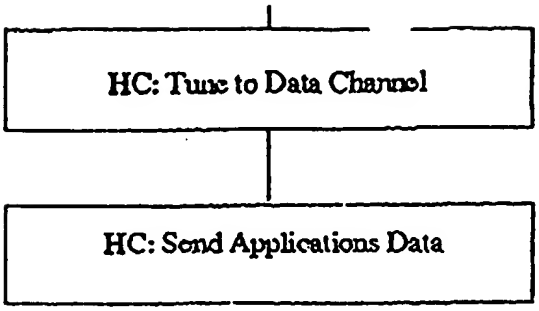
When Hybrid Client receives a Channel Allocation message it then tunes to the specified frequency and begins to transmit the data message which the application wanted to send.

2.1 Connection request flow

Glossary:

A - Application
HC - Hybrid Client
HR - Hybrid Router
SM - System Manager


A: Send data
HC: Create Channel Request
HC: Wait for Poll
HC: Send Channel Request
HR: Receive Channel Request
HR: Send Login message
SM: Verify HC
IIR: Receive Login Response
IIR: Allocate Channel
IIR: Send Channel Allocation
IIC: Receive Channel Allocation



3. Connection flow on a 1-way with a phone return cable network

The connection flow is essentially the same as on the 2-way cable network with a few exceptions.

1. Hybrid Client does not have to wait for a poll. Instead it formulates a Channel Request message and dials the Hybrid Router immediately.

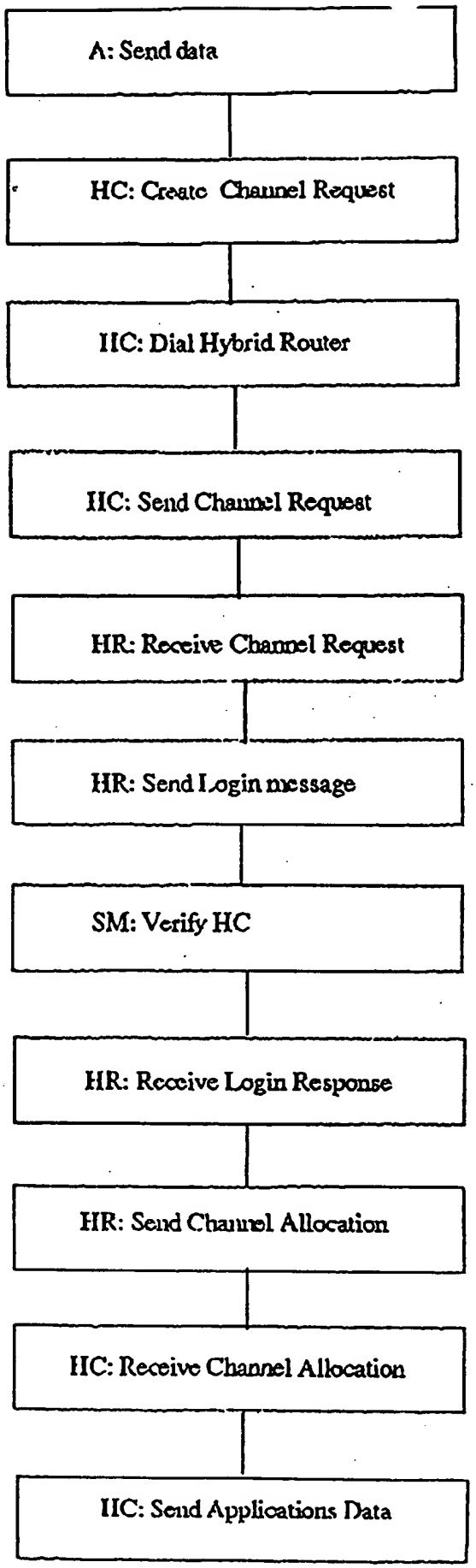
2. Hybrid Router send a Channel Allocation message confirming acceptance of the incoming call, but does not indicate frequency of the data channel as this is not relevant in this case.

3. Hybrid Client starts sending application data over the phone line immediately upon the receipt of the Channel Allocation message.

2.1 Connection request flow

Glossary:

A - Application
HC - Hybrid Client
HR - Hybrid Router
SM - System Manager


A: Send data
HC: Create Channel Request
IIC: Dial Hybrid Router
IIC: Send Channel Request
HR: Receive Channel Request
HR: Send Login message
SM: Verify HC
HR: Receive Login Response
HR: Send Channel Allocation
IIC: Receive Channel Allocation
IIC: Send Applications Data

HUP Client States

1. Introduction

Hybrid Upstream Protocol is a member of a protocol family which mediates communication over a cable network.

Let us consider a client system connected to a cable network and an application which runs on the client. In this context Hybrid Upstream Protocol (HUP) provides the application with a means to request and obtain an upstream channel for data transmissions.

The client communicates with a Hybrid Router through poll responses.

2. Description

HUP client system has 3 basic states: IDLE, CON_REQ and ACTIVE.

In IDLE state the client , when polled, will transmit an Idle poll response if there is no request from the application. It will respond with a Channel Request message if there is data that needs to be sent in the upstream direction. Upon transmitting Channel Request message client will transition to the CON_REQ state.

In CON_REQ state the client expects one of two messages from the Hybrid router: Channel Allocation or No Channel Available message. Upon receiving the former the client informs the application, tunes to the channel it was allocated and transitions to ACTIVE state. Upon receiving the latter the client informs the application and transitions to IDLE state.

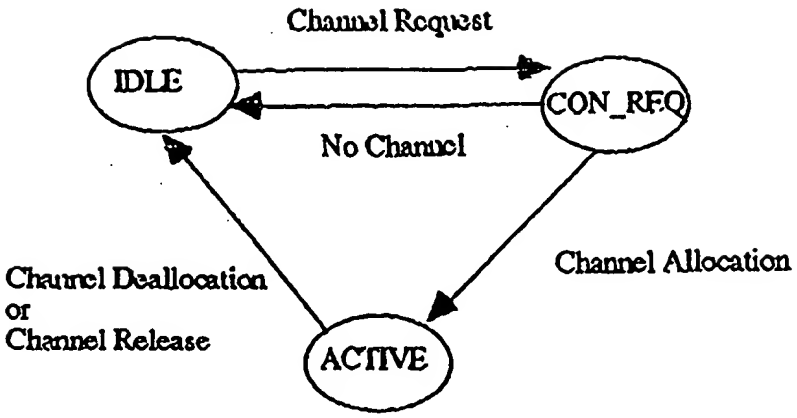
In ACTIVE state the client forwards data messages from the application to the upstream transmitter.

In ACTIVE state the client monitors the application activity and if it detects that no data has moved from the application to the upstream transmitter for a system defined period of time it will send a Channel Deallocation Request and transition to the IDLE state.

In ACTIVE state the application may explicitly request that the channel be released, in which case the client will send a Channel Deallocation Request to the Hybrid router and will transition to the IDLE state.

Hybrid router may also send an unsolicited Channel Release message, in which case the client will notify the application and transition from ACTIVE to IDLE state.

3. State Diagram


Channel Request
IDLE
CON_REQ
No Channel
Channel Allocation
Channel Deallocation
or
Channel Release
ACTIVE

HAG Protocol

1.0 Introduction

Hybrid Adaptive Gain control protocol has been developed to overcome noise and attenuation while transmitting on cable in the upstream direction. HAG is an integral part of Hybrid Upstream Protocol suite and to understand it fully the reader must be familiar with other members of this protocol family.

Hybrid Upstream Protocol uses a form of polling to enable client systems to request a channel or report status. Hybrid router indicates to the client what was the last poll response that it received from the client. This provides the feedback to the client which is necessary for the client to evaluate if its responses are being received by the Hybrid Router.

2.0 Description

HAG has 2 states: STABLE and SEARCHING.

In the STABLE state HAG evaluates poll messages from the Hybrid Router. If the poll message indicates a loss of a poll response then HAG transitions to the SEARCHING state. Poll responses are transmitted at a fixed power level. Periodically the, at a very slow rate, the client will reduce the power level to assess if it is possible to transmit with less power.

In the SEARCHING state the client system will respond to polls with a poll response transmitted at a larger and larger power level. Poll responses will be transmitted starting with some system defined minimum power level and increasing through a system defined maximum power level. Upon reaching the maximum level the client system will transmit poll responses at a minimum power level. This process will continue until a poll

3.0 State Diagram

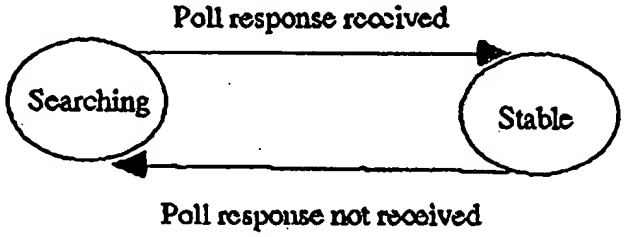


EXHIBIT I

Hybrid

February 1, 1995

Fenwick & West
Attn: Robert Sabath
Two Palo Alto Square
Palo Alto, CA 94306

Re: Flow Diagrams

Dear Bob,

Ed Moura and Jan Gronski have prepared the attached flow diagrams which describe our Hybrid Access System. We believe that you now have enough information to prepare a draft of claims for this patent application.

Please give Ed a call if you need clarification on the flow diagrams and give me a call if you have any other questions.

Yours truly,

Rick Fuller
Vice President, Finance

Hybrid Networks, Inc. • 10201 Bubb Road • Cupertino, CA 95014-4167 • 408-725-3250 • FAX 408-725-2439

Ack Suppression Flow diagram

The following flow diagram depicts the amended pseudocode.

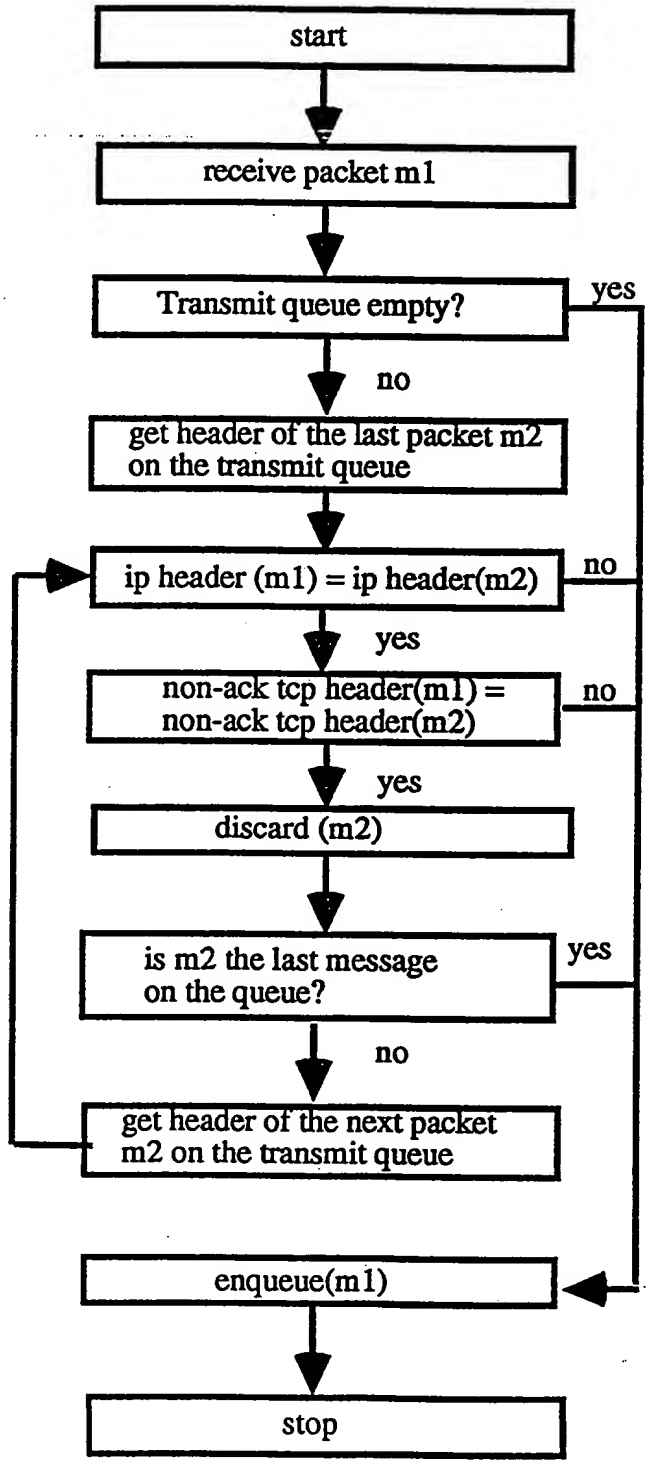


FIGURE 15

Packet Suppression Flow diagram

The following diagram depicts the pseudocode in the previous section.

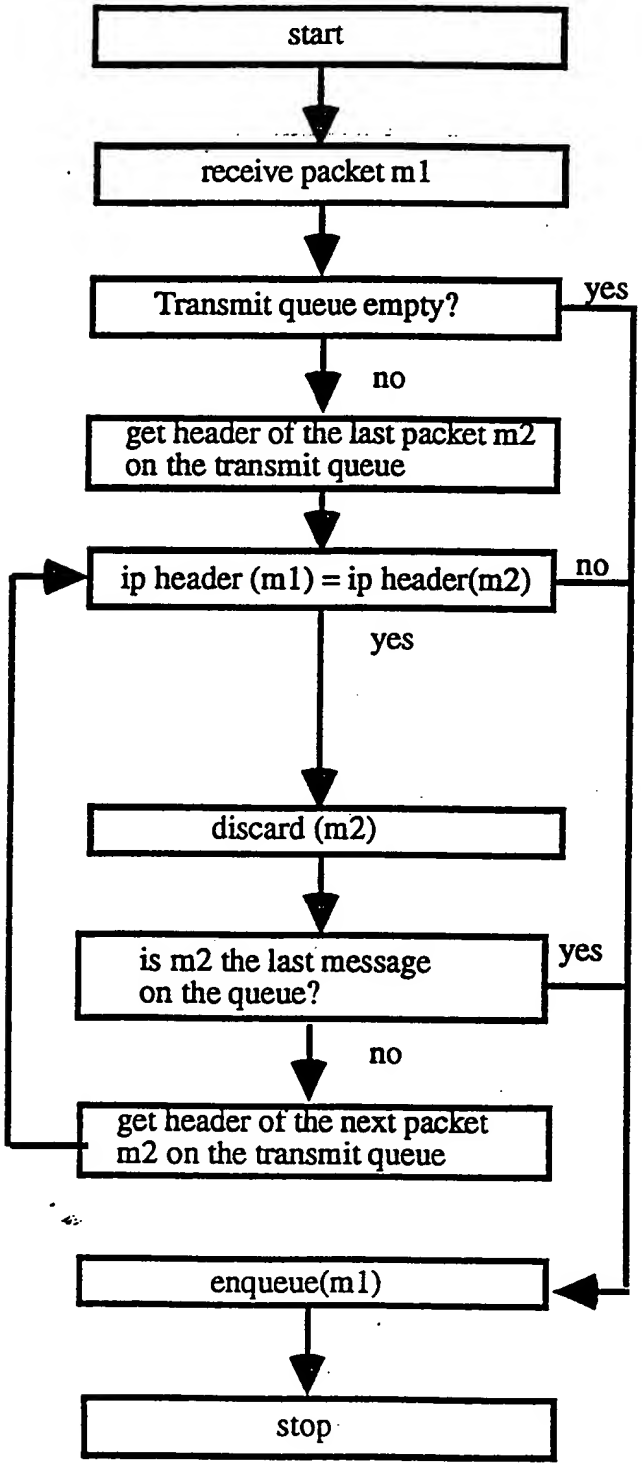


FIGURE 16

Packet Suppression Flow diagram

The following diagram depicts the pseudocode in the previous section.

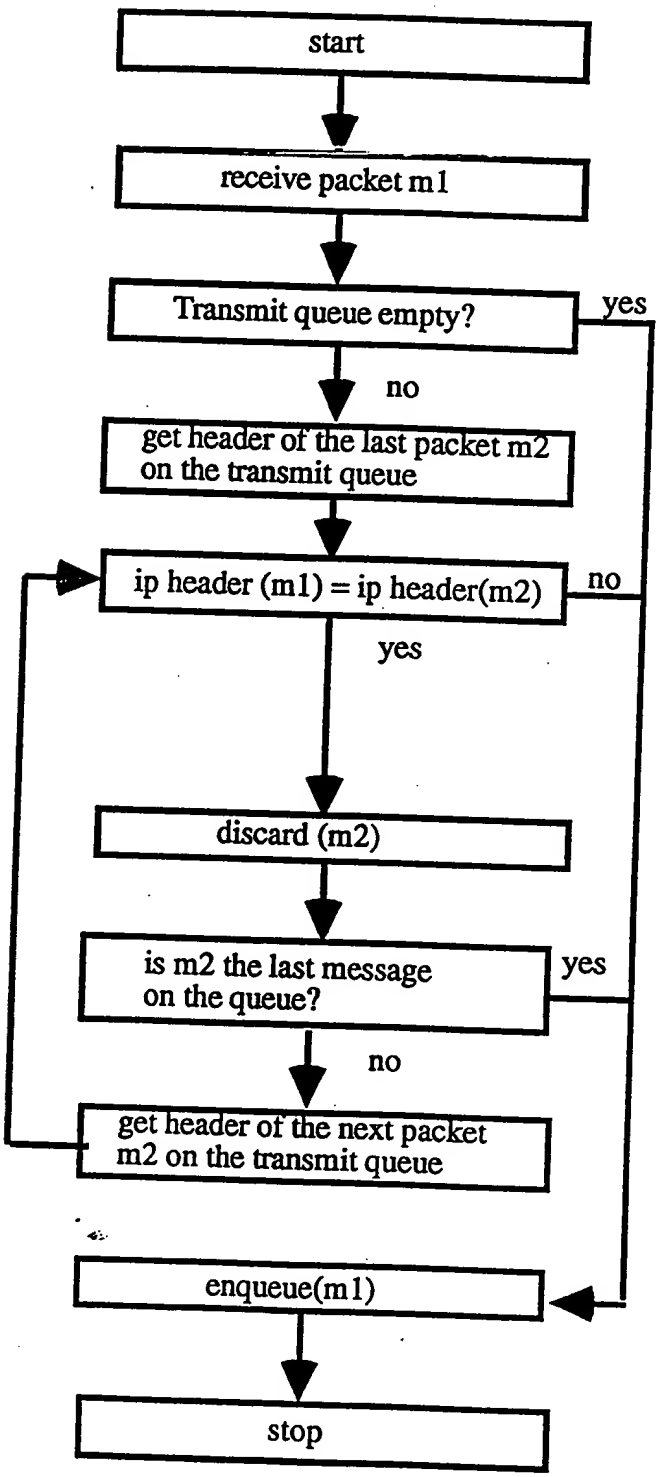


FIGURE 16